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SAWYER-MAN ELECTRIC CO.,

COMMERCIAL AGENT OF THE CONSOLIDATED ELECTRIC LIGHT CO.

No. 510 West 23d Street, New York,

August 1st, 1888.

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ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

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New York's Electric Storm.

Electricity, original and not artificial, was the object of awe and admiration last Saturday evening. It has been many years since New Yorkers saw such an electric display. The day was very warm here, in fact the hottest city in the country. In the evening the storm came in mighty grandeur, and the lightning played familiarly around the switchboards in the telegraph and telephone offices, starting fires in several places, which fortunately were extinguished promptly. The station of the United States Illuminating Company, on West 29th street, was struck by lightning and set on fire. The fire department extinguished the flames before much damage was done. The lights were all put out for the night. A number of other places were struck, a great many people were shocked, but no deaths reported. Lightning shattered the flagstaff of the Union Square Hotel, exploded an electric lamp, and put out all the lights in the hotel café and office, besides knocking Clerk Couden flat on the carpet, and creating a shock in the café that diners there felt distinctly. The electric storm was accompanied by quite a fall of rain.

Testing an Electric Car.

The eight-wheel storage battery car of the Electric Car Company of America was successfully tested on the Lombard and South Streets Line, Philadelphia, last week. The car left the depot at Twenty-fifth and South streets at 1 o'clock, carrying a large load of passengers, among whom were: William Wharton, Jr, president of the Electric Car Company; Abraham Barker and G. H. Condict, general manager; also Thomas C. Barr, president of the Lombard and South Streets Line; E. P. Murphy, secretary and treasurer; Edward J. Moore, a director of the Lombard and South and the People's Line; W. H. Shelmerdine, also a director in the South Street Line, and many other gentlemen who are interested in the car. The round trip was made in 37 minutes, while it requires 55 minutes for the horses to go over the route.

The car is painted yellow and is about half as long again as the ordinary horse car. It will seat forty people comfortably, and held eighty on the second trip without any effect on the speed or stopping and starting, says the Philadelphia *Times*. The motive power is received from two Reckenzaun electric motors of eight horse power, which can be worked up to fifteen horse power. The motors receive their power from one hundred storage battery cells located under the seats, perfectly insulated. The car has been run sixty-three miles with one charging of the cells, but they will be recharged at every forty miles. All the electric appliances, including the motors and cells, weigh 5,800 pounds and the car weighs 9,200 pounds. It is handsomely fitted up inside with mirrors, electric stop-buttons and richly upholstered seats.

The conductor's stop bell is worked by electricity, the driver's danger bell is worked by electricity and the car is lighted with electric incandescent lights. The brake is of the strongest and most improved pattern and acts on all eight wheels. In case the brake should become damaged the car can be stopped by electricity, and can run as well backward as forward. The car runs without the slightest jolt or jerk and President Barr stood in the aisle on the return trip without having to frantically grasp the strap once.

The car can be run at any speed up to twenty miles. Mr. Wharton said that it was established that the car could be run cheaper than with horses. The electricity necessary to run a car for a day will cost two dollars. "I consider the car a perfect success," said Mr. Wharton, "but we will not stop at this, and we could make one better now."

To Test Lightning Conductors.

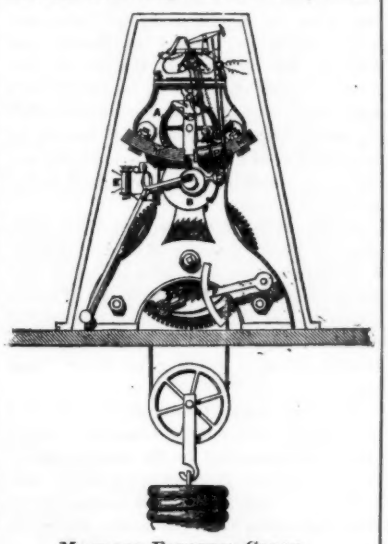
The question of whether lightning conductors should or should not be metallically connected with the gas and water pipes in buildings has been discussed by various scientific societies abroad, and the latest contribution to this controversy came from the German Society of Gas and Water Engineers at their annual meeting in Stuttgart last month, reported in *Industries*. Opinions as regards the utility of such connections were divided, and after a prolonged discussion the matter was referred to a committee, with instructions to consult members of the Society of Electricians and of the Society of German Architects and Engineers. A new instrument for recording when a lightning conductor has acted is now being brought out by Messrs. Hoyer & Glahn, of Schönebeck. Briefly described, this instrument consists of a galvanometer with a long magnetized needle pivoted on a horizontal axis, and kept horizontal by a small weight. Below the needle is a soft iron core surrounded by a solenoid which is coupled as a shunt between two points of the lightning conductor; and if this core becomes excited, one or the other end of the magnet is attracted, and remains attached by virtue of its own permanent magnetism. The inventors thus hope that the instruments will indicate not only through which conductor a lightning discharge has passed, but also the direction of the discharge, whether up or down. Instruments would be fixed on the various lightning conductors, and by mere inspection of them after each thunderstorm it would be easy to see which of the conductors are most likely to be chosen by the lightning, and should therefore receive the most attention to keep in good order. Four of these instruments have now been fixed in Munich, in order to test whether the theory advanced by the inventors is borne out by practical experience.

Electric Road in Boston.

The directors of the West End Street Railway, Boston, have voted to authorize contracts for equipping the line to Brookline with an electric system. The contracts provide for the equipping of 20 cars with the Sprague motor, the building of the Sprague overhead system in Brookline, and the construction of the Bentley-Knight conduit system in Boston beyond the point where overhead wires are forbidden. The Sprague motors will be used on all the cars, and the part of the Bentley-Knight system used will be the conduit and the ploughs by which the current is taken. In the Bentley-Knight system in Allegheny the conduit is in the centre of the track and the ploughs in the centre of the car. In adopting the system for use in Boston, however, it is proposed to place the conduit by the side of the track and the ploughs outside the wheels of the car, but protected by the overhang of the curved sides.

Another "Anticipation" Refuted.

We illustrate herewith the clock referred to by Mr. C. J. Kintner in his letter of June 20th, 1888, on the Tesla Motor, published in the ELECTRICAL REVIEW, June 30th. In our note at end of that letter, we supposed that the clock operated by the alternate reversal of the current, and so it turns out. Mr. T. E. Gatehouse, of our esteemed contemporary, *London Electrical Review*, sends us the following description of the clock in question, taken from the files of that journal of April 15th, 1873. True, it shows the use of alternating impulses as a source of motion, but it is periodic motion, and is far from being what we to-day mean



MAGNETO ELECTRIC CLOCK.

by an alternating current motor. The description referred to is as follows:

"In any building in which a number of clocks are required, it is impossible to keep them synchronously at work, if they are of the ordinary construction, having separate regulators and separate maintaining powers. To remedy this evil, various systems of electric clocks, either maintained or regulated by the action of galvanic currents, have been suggested and tried; but they have all practically failed, principally by reason of the oxidation of the contacts at those points where the circuit is periodically interrupted.

A system of magneto-electric clocks has been designed by Sir Charles Wheatstone so as to be effectually free from this objection. The maintaining power is supplied by magneto-electric currents developed in a coil of wire attached to the pendulum, and made to oscillate over the poles of permanent magnets. Each indicating clock is actuated by *an astatic system of magnetic needles kept in continued rotation by these magnetic-electric currents*, and the motion of these needles is communicated through a suitable train of wheelwork to the hands. In this way the whole wire circuit remains unbroken, *and the currents are alternately inverted without any making and remaking of contacts* (which are the chief source of failure of the electric system) being employed. A single motor on this principle will actuate sixty or seventy indicating clocks in the same circuit.

The accompanying illustrations will fully explain the detail of the working arrangements. Fig. 1 is a front elevation of the motor or driving-clock, which consists of a strong clockwork movement, supported by the iron frame, A A, and maintained by the weight, W. The escapement of this clock moves the pendulum, P, the "bob" of which (a coil of fine insulated copper wire) passes at each beat over the poles of two magnets, M M. When this motor is regulated by a standard or astronomical clock, the regulation is effected by raising or lowering the center of gravity of the pendulum, P, by means of a ball kept swinging with the pendulum, and the position of which is altered by the end of a lever, which, when released, falls upon the inclines of a notch in the disc B, which rotates once in two hours.

The internal mechanism of the indicating clocks consists of a coil of wire with *an astatic system of needles on the axis of which is a pinion, gearing into the wheelwork which moves the hands.* The wire of the coil is connected by means of insulated wires with the coil of the pendulum-bob P (Fig. 1), in an unbroken metallic circuit.

A system of these clocks is at present working in *the Royal Institution*, in the University of London at Burlington House, and at the International Exhibition."

There is no such condition here as the co-existence of two alternating currents of different phase; and necessarily so since there is but a single circuit.

The Westinghouse Company Secures the Tesla Motor.

In the Pittsburgh *Post* of recent date, appears the following notice, which, after making due allowance for the Pittsburgh reporter's enthusiasm, evidently means that the progressive Westinghouse Electric Company has promptly realized the value of the work of the talented young inventor and experimenter, Mr. Nikola Tesla:

"It is safe to say that the Westinghouse Electric Company has a gold mine in its new electric motor. The public, even the electric public, has not yet reached a realization of the importance of the invention The motor was invented by Nikola Tesla, a native of Lika, a town on the border line of Austria and Hungary. He was educated in Austria, and graduated as a civil engineer. Electricity soon claimed his entire attention, and now, though apparently less than 30 years of age, he has a very wide reputation as an electrician. The Westinghouse has contracted for his patents on the new motor, and he has been in the city several weeks proving all he claims for his invention. When the company is satisfied, the contracts will be signed."

Alexander Henderson has recently been appointed by the Brush Electric Company of Cleveland, as superintendent of Construction for the States of Virginia and North and South Carolina, with headquarters at Greenville, S. C. Mr. Henderson has been connected with the Brush Electric Company for a number of years, and is considered one of their most skilful experts. He has just completed the new electric light station for the city of Greenville. The construction of the whole plant was done in a remarkably short time, as many as fifty or sixty men being employed.

The Burton Electric Heater.

SECOND PAPER—INTRODUCTION OF THE DYNAMO—MORE DISCOURAGEMENT—THE PHILADELPHIA EXHIBITION—HOPE.

To the Editor of Electrical Review:

During the long interval which followed the practical abandonment of the electric heater by the parties mentioned before, it must not be supposed that the inventor had given up all hope of its ultimate success after the later introduction of the dynamo electric machine. Being without the means and apparatus to continue his investigations independently, he hoped by correspondence with electricians to get them interested in his project; but almost without exception, when a reply was received at all, it was discouraging.

Owing to the conspicuous prominence occupied by Mr. T. A. Edison at that time, the inventor very naturally attempted to attract his attention to the heater, and with this end in view, addressed him a letter on the subject. Here is his reply:

Menlo Park, N. J., Nov. 13, 1878.
Dr. W. Leigh Burton,
Richmond, Va.

Dear Sir.—Yours of the 9th was duly received. I have but little faith in your electric heater, to be candid with you, but if you choose to do so, you can send it to me for inspection. Send by express to my address, Metuchen, N. J., Penna. R. R.

Very truly,
T. A. Edison.
G.

The model was duly forwarded, and in a little over a month's time, the following letter was received:

Menlo Park, N. J., Dec. 19, 1878.
Dr. W. Leigh Burton,
Richmond, Va.

Dear Sir.—I have not given your model a thorough test, but I feel certain that it cannot be made practicable only at an enormous expense.

I have it boxed up and will send it to you by express to-morrow, as I do not see any prospect of my getting time to do anything further with it.

Very truly,
T. A. Edison.
G.

About the same time a northern young gentlemen, who had settled in Virginia, being in the inventor's private office, advised him to write a description of the heater to Prof. Morton, of the Stevens Institute of Technology, Hoboken, N. J., and request his opinion of the heater. The reply came, but it was written on the back of the letter that had been written him, and it was to the effect that the inventor was but little removed from a fool or a lunatic.

Here ensued a rest until the following year when a correspondence was opened with the Telegraph Supply Company, of Cleveland, Ohio. Under date of October 26, 1879, Mr. G. W. Stockly, of that Company, writes:

"Your favor of 23d received. It it practicable to produce heat by such an apparatus as you describe, but there is no possible hope of doing it economically. An apparatus almost identically the same as yours was fully described in a scientific publication over 15 years ago, and read at the time by our Mr. Brush. It is *hopeless*, economically consid ered."

Further correspondence induced this company to make a test of a model which had been sent them, but the result was far from encouraging, as the letter below will show:

Cleveland, Ohio, Oct. 11, 1879.
Dr. W. Leigh Burton,
Richmond, Va.

Dear Sir.—Your favor of the 9th received. We tested your apparatus for electro-heating, and found that it would probably answer as well as any other, and perhaps better, for that purpose. You are probably aware, however, that the best steam engines of the present day do not utilize much, if any more than 10 per cent. of the power due to the burning of coal under their boilers; and as the best dynamo-electric machines only have available for external work two-thirds of the steam power they absorb, it will be seen that about seven times as much coal would have to be burned under the boiler to run the dynamo-electric machine for heating a certain space, as would have to be used by heating the same space by stoves that utilize one-half the coal. With these facts in view, you must see that heating by the use of electricity would be an uneconomical process.

Yours respectfully,
Telegraph Supply Co.

In order that the following letter should be better understood, it should be explained that the proposition of the inventor at that time was, that the current to warm the heaters on railway cars should be furnished by a dynamo machine operated by a pulley connected with the axle of the car; and the following year a letter was addressed to Mr. Chas. J. Van Depoele, then a resident of Detroit, in which this proposed plan was fully unfolded. To this letter Mr. Van Depoele replied as follows:

Your letter received in due time. * * * As I understand your proposition is to render incandescent conductors by the passage of the current generated by the axle of the car carrying a driving pulley to run the dynamo machine, this is practicable, only there is a good deal of loss in converting power into heat. If a dynamo machine of not too great power would be sufficient to heat one car, say four horse power, then it could be made practical. Some arrangement could be made to heat several wires at one time, as I understand you have accomplished this. I have now an apparatus which will burn a wire 12 feet long, and keep incandescent about 25 feet. I would be glad to try your system, and if there is anything in it, would report you at once what could be done.

Please give me more data, and I will be glad to express my fair opinion.

I am yours very respectfully,
Chas. J. Van Depoele.

This letter was much more favorable than any yet elicited; but the preponderance of unfavorable opinion against the heater was too great to expect assistance from any source relying on "expert" testimony; and had not Mr. William F. Owens, of New York, actuated by sympathy for the inventor and a blind confidence in his work, furnished the means for the construction of heaters for making special tests with the dynamo machine, it would now be "wrapped in the mantle of oblivion."

Before the means had been provided, however, for the construction of the new heaters, a correspondence, and later, a warm personal friendship, had induced Mr. Thomas Pray, Jr., of Boston, to take the liveliest interest in the heater, or as he afterwards termed it, after cooking on it, a "shad pan."

Mr. Pray, at this time, was the editor of the Boston *Journal of Commerce*, which paper, being devoted to the manufacturing interests of New England, gave him a wide influence. But Mr. Pray experienced the same difficulties with the heater in Boston as the inventor did in Richmond; and though he had access to dynamo machines, which privilege the inventor did not enjoy, and though he may have spent considerable money in the attempt to put the invention in commercial shape, he finally returned the models to Richmond and abandoned the attempt.

In the Spring of 1882 there were in Richmond several dynamo machines, which had been brought there to furnish the electric light the preceding year, during the "Yorktown centennial celebration." A "Brush" machine was still in operation on 8th street, but the others had either been sent back to the north, or packed for shipment. With the aid furnished by Mr. Owens, the construction of a heater was at once commenced, and in the course of a month was ready for the test to be made with it. Just then, however, a serious difficulty arose, as the "Brush" dynamo had been taken down and removed to the basement of Mr. Andrew Pizzini's residence, situated at the corner of 8th and Grace streets. The only thing to be done now was to attempt to make a test with the machine by using "hand power." This proved an utter failure, and the inventor, disheartened, was about to abandon the attempt for the time, when, by the merest accident, he fell in with a gentlemen who had in his charge a ten-light "Weston" machine, but which was stored in the basement of a carriage factory on 10th street. Arrangements were then made for the use of this machine, the conditions being that it should be removed to the box factory at the corner of 24th and Main streets, to be there driven by a steam engine in charge of a particular engineer.

Heretofore no particular description has been given of the heater, the principle being thoroughly explained in the patent; but as a practical test of the new model was now to be made, a general idea of it may be had by stating that *it consisted of an alternate arrangement of obstructing media and free conductors or radiators, arranged in a compact form, and insulated within a fire proof casing, covered by a metal plate.*

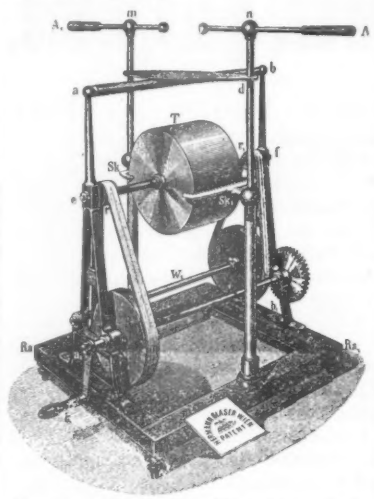


Fig. 1.—The Glaser New Influence Machine.

In this heater the "obstructing media" consisted of platinum wire No. 25, and the "free conductors" of copper blocks one inch and three-quarters long, and half an inch square. The electrical resistance could not be definitely ascertained in the absence of proper measuring instruments; but it was low compared with the heater in its present form, owing to the fact that the aggregate length of the obstructing media in the entire coil would only amount to a little over one foot of platinum wire of the size indicated.

In the building above mentioned then, in the month of May, 1882, *was the first test made with the heater with a current from a dynamo machine;* and here it was demonstrated beyond a doubt, that it "had a future." The copper blocks of the resistance

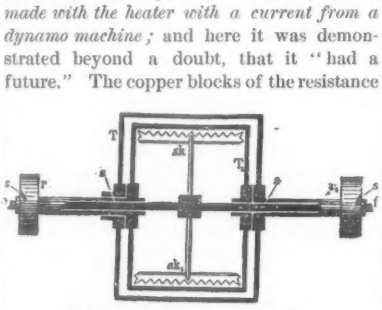


Fig. 2.—Section of Same.

coil were heated to *redness* by the heat developed in the platinum wire, the dynamo being driven at one-third speed. At another test made soon after, when Mr. Thomas Pray, Jr., of Boston, was present, *water was boiled and meat cooked;* and taking advantage of the boiling water to cook eggs, these were eaten at the table of the inventor the same evening.

The next test of a heater by a dynamo current was made at the armory of the First Virginia Regiment, in Richmond, in the Spring of 1884, during the progress of the fair for the benefit of the Confederate veterans. In this case, a 10-light Thomson-Houston dynamo was used, and the heater, having only one-tenth of an ohm resistance, was placed in circuit with the lamps, being probably the first instance in which heat and light were produced from the same current of electricity.

During the progress of these tests, when the heater was in operation every evening for a week or more, Mr. Joseph W. Kates, then superintendent of the Southern Telegraph Company, and in charge of the electrical plant, and to whom, let it be said, the inventor had been indebted for many kind favors, proposed that he should write to Mr. Barton, treasurer of the Thomson-Houston Company, in Boston, with the view of calling his attention to the working of the heater, referring him, if necessary, to one of the company's own employés attendant on the dynamo, for corroboration of his statements. This was done, and in course of time Mr. Barton replied to the effect that he had referred the letter to Professor Thomson, who said he had seen electric heaters in Paris, but they were no "good." This circumstance is mentioned for the reason that, further on, Professor Thomson's opinion, thus expressed, came near being the cause of serious inconvenience to the inventor.

Wearied with a long succession of disappointments, the inventor was rejoiced when he learned that it was proposed to hold an international electrical exhibition at Philadelphia during the coming fall, when the fortunes of the heater might be decided by the verdict of the proper scientific tribunal. After correspondence with the proper officials of the exhibition, space was engaged and the heater regularly entered; and, as showing the distrust at the time in *any* electric heater, the following extract of a letter from Col. Chas. H. Banes, chairman of the general committee, under date of August 7th, 1884, is here given:

* * * "I would advise you, as the most prominent electricians in the country, and I may say in the world, will be at the electrical exhibition, that it would be greatly to your interest if, instead of a model, you could put in a heater in practical operation. You are aware of the prize that has been offered by the French Society for inventions similar to yours, and it seems to me that you have a good opportunity now either to assure the public or to undeceive yourself."

This opportunity was what the inventor sought, and on the 2d day of September, 1884, both himself and the electric heater were in the city of Philadelphia, he "to assure the public or undeceive himself."

From this time on, the name of Prof. Edwin J. Houston is inseparably associated with the fortunes of the Burton electric heater. Holding the responsible position of chief electrician to the greatest electrical exhibition ever held before in the world, his opinion of any electrical invention was entitled to weight. How soothing were his words then, when, after he had examined and thoroughly understood the construction and principles of the heater, he said in the kindest way to the inventor, "You deserve great credit for the originality of your heater. There is nothing in the building like it."

Later, he offered to introduce the inventor to the representatives of the different electric light companies who had exhibits in the building, and, in response to this offer, an introduction was sought to Mr. E. W. Rice, representing the Thomson-Houston Company, mainly for the reason that, having made so favorable a test with the heater with the current from a Thomson-Houston dynamo in Richmond, he was anxious to use a similar machine there. But Mr. Rice refused to allow the heater to be tested by one of his machines, giving as his reason that, knowing the opinion of Professor Thomson of electric heaters, he could not allow it!

Learning that Mr. Charles J. Van Depoele had an electrical exhibit here, the inventor sought an introduction to him. In this case his reception was quite different, as Mr. Van Depoele not only expressed great pleasure at the introduction, but cheerfully offered to furnish him every facility in the way of current for testing the heater.

While waiting for Mr. Van Depoele to put his dynamos in position and arrange the belting for driving them, in order that a test might be made with the heater, it happened that one day Professor Houston approached the inventor in the exposition building, and said:

"I have been thinking of your heater ever since I examined it, and I must say that the more I think of it the better I like it."

The inventor, of course, appreciated this compliment to the heater from such a source, when Professor Houston added:

"As your heater is so little known in scientific circles, don't you think you can arrange to give us a lecture on it?"

This request was so entirely unexpected that the invitation was declined, although Professor Houston offered to furnish a small

dynamo and every other facility for making a thorough demonstration of its possibilities.

Finally, Mr. Van Depoele was ready for testing the heater, and on the 3d September, 1884, it was shown in operation. There were present at this test, Prof. Edwin J. Houston, Dr. N. S. Keith, Mr. Chas. J. Van Depoele. and 10 or 15 other people unknown to the inventor. Dr. Keith did most of the talking and questioning, and on this occasion said that the heater before him was *fifteen years in advance of the times.*

On the evening of the 5th September, Mr. Van Depoele had the heater connected on the same circuit with a motor driving a sewing machine, and an arc lamp, thus producing *heat, light and power* from the same current of electricity.

This was the last test of the heater at Philadelphia in the presence of the inventor, and the next morning he left that city for Richmond, inspired with the hope that, after all, he had not for so many weary years been "chasing a shadow."

On a New Influence Machine.

In a recent number of the *Elektrotechnisher Anzeiger*, Professor Lewandowski describes in detail the new machine invented and patented by Hermann Gläser, of Vienna.

As the illustrations on page 2 show, the peculiarity of this machine is that, instead of revolving plates, two closed concentric cylinders of hard rubber are used. These revolve in opposite directions around a common axis, but, of course, without touching. This construction allows a much more compact machine than the usual forms, and protects most of the exciting surface from atmospheric influences.

The machine is easily excited by holding an electrified rod near the outer cylinder, and retains its charge a long time. Sparks may be drawn in length up to two-thirds of the diameter of the drum.

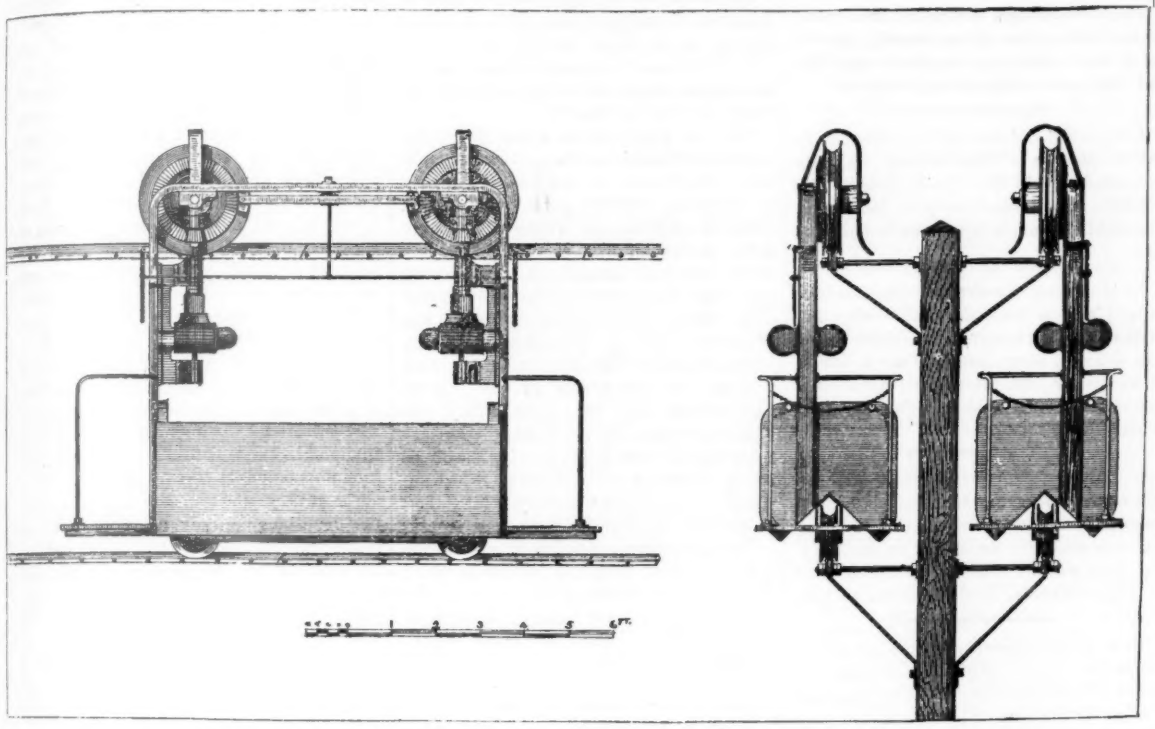
The author speaks in the highest terms of the capacity, reliability and good workmanship of the apparatus.

— The City Council of San Diego, Cal., has granted a franchise to George D. Copeland similar to that owned by the Fort Wayne Jenney Electric Light Company, permitting him to erect poles and string wires for incandescent electric lighting. Like the Jenney franchise, the one granted to Mr. Copeland will expire on October 10, 1895.

— The Thomson-Houston Electric Co. are furnishing additional electrical equipment to the Suburban Street Railway Co., Scranton, Pa. In the same city they are supplying the Scranton Passenger R. R. Co. with four cars and two miles of track.

Suspension Transportation for Mining Work.

Electric motors are rapidly coming into use in mining circles. In mine tramways, if there be no serious obstacles in grades, canons, etc., the road can be operated as usual, by one or more electric motor cars. But if there are special obstacles to be overcome, suspension transportation for mining work is being introduced by the Sprague Company. It consists of two stationary steel cables, suspended one above the other between posts of wood or metal, 50 feet and upwards apart, and at such an elevation from the ground as not to interfere with surface traffic. The cars run on wheels, and are suspended between the upper and lower cables, the upper cable carrying most of the weight. The upper cable is charged with a positive, and the lower with a negative, current of electricity. By contact of the wheels with the cables, the current is conveyed to an electric motor in the car, which imparts motion to the wheel by gears, etc. These cars can be of any pattern, dimensions or material required by the service, and can be run at a rate of from four to 20 miles an hour.



FIGS. 1 AND 2.—SIDE VIEW OF ORE OR COAL CAR, AND END VIEW PASSING A POST.—ELECTRIC SYSTEM.

An Electric Railway at Omaha.

Electrical cars will be run over the Omaha and Council Bluffs bridge. The company has just contracted for a double track electric street railway to cross the bridge and run to central Council Bluffs.

The length of the road from Omaha to the other side will be four and a half miles, and the double track gives the company nine miles of road. The electric cars and wagons have different routes.

Cars will run every 10 minutes and travel 15 miles an hour. The power station will be located at the east end of the bridge, near the waterworks of Council Bluffs. It will supply the electric light for illuminating the bridge. The company will adopt the Thomson-Houston system. The railway will be finished October 1.

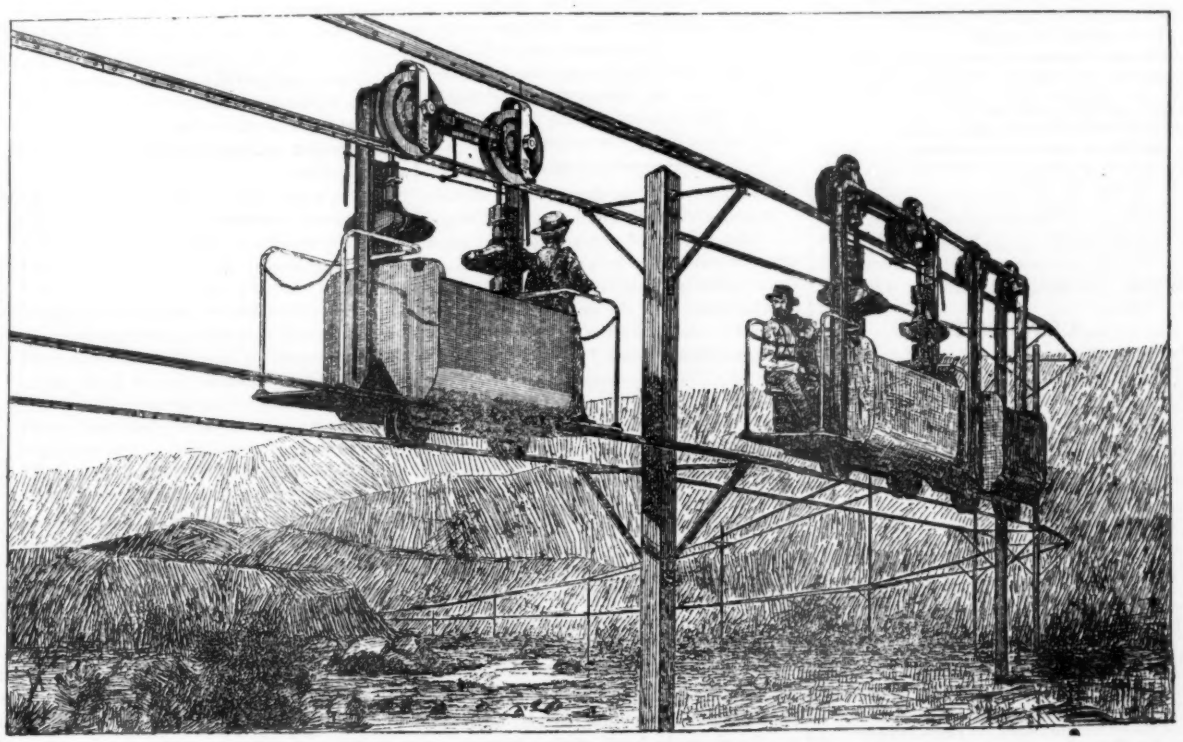


FIG. 3.—DOUBLE TRACK ELECTRIC WIRE ROAD FOR MILLING AND MILL PURPOSES.

The Mooted Lightning Rod.

The ELECTRICAL REVIEW says "the lightning rod is a relic of superstition, and will soon be regarded in the same light as a horseshoe over a door." Is this statement true? I always had the impression, that, with a proper ground connection, a lightning rod was an almost absolute protection from lightning.—BEN FRANKLIN, Greenpoint, N. Y.

We cannot credit the statement that the sweeping condemnation of the lightning rod contained in the quoted item emanated from a journal of such prominence and ability as the ELECTRICAL REVIEW. The efficiency of a metallic conductor of generous area, properly erected upon a building, and, above all, properly grounded in accordance with well-established rules, is as well proven as is the efficiency of vaccination as a preventive of small-pox. As to the lightning rod being an *absolute* protection against the destructive effects of lightning, we would remark that there is no such thing in this world as absolute protection against anything. We cannot gauge and limit the limitless energies of nature. Science has established the identity of the lightning with electricity, has mastered by observation and experiment the laws governing its manifestations, and has indicated the precautions to be taken to guard against its destructiveness. But though human prevision may succeed in averting disaster in ninety-nine cases, it may fail in the one hundredth; not from any error inherent in the principle, which insured safety to the ninety and nine, but from its improper application to the conditions of the one hundredth case. That the lightning rod should occasionally be condemned as a delusion and a snare, is not to be wondered at, when the fact is recalled that great numbers of them are erected on buildings throughout the country by ignorant, itinerant peddlers. Indeed, the wonder is, in view of the quackery that has invaded the lightning rod business, that the rod is not more generally discredited.—*Dr. Wm. H. Wahl in the Manufacturer and Builder.*

The REVIEW has severely criticised the inferior work so often done by lightning rod men, and called attention to the many frauds perpetrated upon innocent farmers by the alleged members of this fraternity.

The "relic of superstition" statement was a paragraph in a correspondent's letter published in the REVIEW several months ago.

Platinum in the Sun's Atmosphere.

Messrs. Hutchins and Holden recently gave an account of certain investigations upon the solar spectrum, which seem to prove the presence of the metal platinum in the sun's atmosphere. This is the first time any lines corresponding to that element have been observed. They also find additional evidence of the presence of cadmium, bismuth and silver, which have always been considered doubtful, while the presence of lead, tin, potassium, lithium and the cerium group is not confirmed.

A new coal mining company, known as the Electric Motor Company, which has a patent for mining by electricity, will establish a plant at Philadelphia, Pa., for the mining of an area of 10 miles. The plant, as a whole, is to consist of a central dynamo, conducting wires, coal-cutting machine, electric lamps, and motor attachments for hanging the mining cars.

ELECTRICAL REVIEW

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GEO. WORTHINGTON, - - Editor.
CHARLES W. PRICE, - Associate Editor.
T. J. McTIGHE, Electrician and Manager Patent Bureau.
LOREN N. DOWNS, - - President.

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☞ No attention will be paid to communications without the *name and address of the writer.*

We invite correspondence from Electricians, Inventors, and the Telegragh and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Timothy W. Sprague, Massachusetts Institute of Technology, is our representative at Boston, Mass.
Mr. C. C. Haskins, 118 La Salle Street, Chicago, Ill., represents the REVIEW in the West.

NEW YORK, AUG. 11, 1888.

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The REVIEW presents a great diversity of news this week. If any reader is not thoroughly satisfied, he should look out for next week's issue.

The railroad managers think they can't give a reduced rate to the electric light delegates. Some of these days electricity will be running their roads!

These are the days of expositions in many of the leading cities of the country, and we are pleased to note that electrical apparatus and designs are conspicuously honored.

A French electrician says he will soon be able to produce a thunderstorm whenever demanded, and in the district desired. He would be a good man to have in conventions. The right man might get struck by lightning then.

An interesting interference case has been on trial in New York the past week. The parties to the contest are Prof. Elihu Thomson, of Lynn, Mass., and Dr. Otto A. Moses, of New York, the priority of invention in relation to electric welding being the point at issue.

Mr. Frank J. Sprague recently delivered an address before the officials and men at the torpedo station at Newport. Mr. Sprague, who was formerly an official in the navy, was very warmly thanked by Commander Goodrich for his able and interesting address.

There is an extensive, uncultivated and, as yet, undiscovered field ahead of the new promoters of the phonograph. May they find it as productive as their pluck and enterprise merits. The future of the phonograph, the REVIEW predicts, will be filled with astounding results.

The American Association for the Advancement of Science meets in Cleveland, Ohio, August 14th to 21st. The city on the lakes will be an agreeable place these warm days, and the REVIEW hopes to see science advanced in the interesting manner characteristic of this able body.

The New England Electric Exchange is now issuing licenses, upon their passing examinations, to all electrical workers in New England. Class No. 1 represents the highest qualifications, the classes grading down to No. 5. The first examination was held July 24th, and ten licenses were issued.

Telephone men, as they become electric light men—and their number is increasing—lose that feeling of antagonism that their stronger-current brethren so often provoked. Sweet peace is a good thing to have in electrical circles. (All the parent electric light companies—each with a pet patent suit—softly murmur "Amen.")

A western railroad has appointed the inventor of a watch protector its "Inspector-in-chief of Timepieces." Up to the time of going to press, he has not recommended the purchase of any other inventor's timepieces. We would suggest that an individual holding this office should be as free from prejudice as the purchasing agent or any other official. If the road in question desires to keep abreast of the latest improvements, it will have to adopt a different policy.

The papers promised for the New York electric light convention, several of which are already in the hands of the chairman of the executive committee, will treat of live and timely topics, and these with the resulting discussion will make the occasion most valuable and important. Besides, it will do every electric man in the country much good to get away from his station for a few days, and meet and confer with other wide-awake men from all parts of the Union. New York will find room for all electrical men who come, and the REVIEW hopes to see them all here during the convention.

OUR BOARD OF ELECTRICAL CONTROL.

However much opinions may differ in regard to the first Napoleon personally, it is universally acknowledged that he surrounded himself with a most efficacious support. The cause of this was his deep knowledge of men, and his keen appreciation of talent and capability for the performance of duty.

The result was a more powerful government than France had possessed for centuries before, during which period appointments were mostly made by royal favoritism, mainly based on the supposed privileges of birth, and rarely on talent or capacity.

The weak feature of our system of government is that appointments to places of public trust and influence are rarely made for talent or capability, but by political favoritism, based on bargains and bribery. The result is that a class of men come in office even worse than those appointed by royal favoritism, as the latter were at least well educated and refined, which cannot always be said of those appointed by political influence.

Appointments are seldom made with reference to the fitness of the individuals selected for the duties they will have to perform, and frequently their principal occupation consists in drawing the liberal salary connected with the office which becomes a mere sinecure, as they hire others to perform the office functions.

The appointment of the Board of Electrical Control in New York City is a case in point. This board was intended to devise means for reducing the immense number of overhead wires, and to place as many underground as practicable. It is a very difficult problem, which requires in those charged with its execution, firstly, a thorough knowledge of electrical engineering; secondly, a discriminating judgment in order to determine which cases can be treated rigorously, and which cases require leniency in the strict application of the law, for reason of the public interest, which often may be made to suffer serious injury by an unreasonable rigor in the application of regulations adopted as law, or of which the lawfulness may be doubtful in regard to their constitutionality.

A man like the first Napoleon would, no doubt, have made his selection among men of the most eminent standing in electrical circles, especially such as have occupied themselves with that branch of electrical engineering which relates to the subjects of electric conductivity and the serious inductive influences, which is the great drawback where many wires have to be brought close together, as is necessary in the case of subterranean conduits, and can only be corrected by a thorough theoretical knowledge of the laws governing such currents, and which have been tested and demonstrated in practice. It is not difficult to find such men; there are eminent electricians employed by the telephone, telegraph and electric light companies, whose interests require the employment of capable men only, and who would have been glad to place their knowledge at the service of the public good, especially when at the same time they could improve their own financial condition at the tune of $5,000 per year. If objection were made to appoint employés of existing companies, there are many inventors who have proved their merits in this line by obtaining valuable patents. If objection were also made to them, the best men in the scientific and practical branches of electric work comprise the membership of the Electric Club, many of whom are particularly fitted for the duties of electric wire commissioner. Here occurs to us on the instant the names of E. T. Gilliland, Stephen D. Field, C. H. Haskins, Ed. J. Hall, Jr., Prof. Wm. A. Anthony, Frank J. Sprague, Dr. P. H. Vander Weyde, W. D. Sargent, Dr. Leonard Waldo.

Such would have been the proper kind of men to appoint, as they would not need to indulge in experimenting in order to learn what not to do. They would have saved thousands of dollars, which were wasted when conduits and cables were laid down under the auspices of ignorant parties.

It appears that the New York board have at last determined to earn their salaries, not by the proper performance of duty, but to go to law and attempt to compel the U. S. Illuminating Company to do the impossible, and at once put all its wires underground. If they had a clear idea of the difficulties connected with the subject, they would not have taken such a step. The difficulties are so great that we may just as well abandon electric illumination; in fact this would be better as then there would not be an increased digging up of the streets. The conduits prepared by the board are utterly unfit and inadequate, and any attempt to use them would at once be resented and protested against by the public in general and by all the users of telephones in particular, because many of the existing telephone lines would at once become useless. The fact is that the business part of New York is not laid out like Washington, but most of its streets are so narrow and are under the pavement so filled up with sewers, gas and water pipes, steam heating conduits, pneumatic tubes, telegraph and telephone conduits, that actually there is no room left to place electric light wires far enough out of the vicinity of telephone and telegraph wires, so as not to disturb the instruments connected with the latter. Any fluctuation in the powerful dynamo currents feeding arc lights (and such fluctuation are very frequent) may cause clicks in telegraph sounders and will generate disturbing noises in telephone receivers connected with wires not combined on the principle of the twisted metallic circuit now coming into use; and even then telephone disturbances may occur, owing to the very powerful currents produced by dynamos and the exquisite sensitiveness of telephonic receivers for the reception of the merest traces of induced currents, as is well known to practical electricians.

Then the electric light wires, when buried underground, will require two wires branching upward at every electric light pole, while they will have to cross and recross the streets which, if attempted underground, will cause no end of trouble, but is easy and simple when going overhead as is the case now. All that is needed for safety is a good insulation, and for this the means are at hand which the electric companies are glad to apply and in which direction they continually are improving their system.

Electric welding, will, we are confident, become a great industry.

Mr. Samuel M. Bryan left his large telephone interests in Washington last week, and came over to New York to investigate cables and switchboards here.

The ever-popular electrical clambake of Eugene Phillips is announced for Saturday, September 1st. The electric light convention occurs the same week, but will probably adjourn the Friday preceding.

In response to inquiries we would state that the annual telephone convention will begin Tuesday, September 4th, and will be held at the Hotel Brunswick, New York. The National Electric Light Association will convene at the same place on Wednesday of the week preceding.

The REVIEW mourns the death of the gallant and dauntless Sheridan. We had hoped with thousands of our countrymen that this brave man, the last but one of the great generals of the civil war, would be with us for many years. No officer ever had more devoted soldiers, and he was loved by every true citizen of the Union. His death was peaceful and painless, a fitting end to a life of noble achievement that will make his name ever honored and historic.

The Excelsior people of Chicago—F. W. Horne, manager—have quite recently sold a 200 incandescent plant for Knapp, Stout & Co., Menominee, Wis., a 30 arc plant to the Eau Claire, Wis., Electric Light and Power Company, and a plant of 30 arcs to T. B. Leiter, Chicago.

"C. C. H." ON HIS VACATION.

(Special Correspondence.)

Just as poverty makes us acquainted with strange bedfellows, so vacations make us familliar with odd people, places and things.

Away up here on the northwest corner of the Southern Peninsula of Michigan I found electric lights everywhere, and the people seem imbued with the notion that there is but one kind worth having, and of course they have that kind.

When at the supper table the "little hairpins in bottles" commenced to glow, I found that the light was far below sixteen candle power, and sauntering about the city I found that only two customers were getting good light. These two parties are the Arlington Hotel and the railroad passenger depot. The lights in these two instances are run by a storage battery, and this in turn is fed from the dynamos at the central station.

Of several parties whom I inquired, I could not get the cause of the dim illumination, so I fired one leader: "Where is the central station?" and the mystery explained itself. The plant is run by water power, and the supply is inadequate for the purpose. Only that and nothing more.

I went to the station, a mile or more away from the hotel, and found it on Bear Creek, a stream on which there are several mills above the electric light dam. When there is plenty of water the mills run steadily, and the candle power of the lamps is up to standard. When it is scarce a mill will run until its dam is emptied, and then catch all that comes until it fills again. The water is low, because of no rain, and the result is the lamentable one visible here to-day.

The plant, however, is a very neat one, with dynamo capacity for five hundred lamps. When put in it was sufficiently supplied with water for the demand, but the light soon grew more popular, and the demand has exceeded the supply.

Mr. Myron H. Beals, the manager, tells me he has an engine ordered, and is in daily expectation of working out of his difficulty; in the mean time he is watching the clouds with much anxiety, and hoping, if not praying, for rain.

On the plant—which is an Edison one—I found a novel application of current for advertising purposes. In the show window of a restaurant, a series of colored lights were being revolved by a C. & C. motor fed by the main current. The effect was a sort of perpetual Fourth of July fire wheel show, the colors of which were red, white and blue. The effect is quite pretty, and the attraction a catchy one.

There is a lesson for the constructors of electric light plants in this case, which should be impressed upon their memories with indelible ink in good sized letters. It is a mistake to attempt to run an electric light plant with water power, where its least capacity is not up to the full maximum load possible by growth. The Emersonian truism, "Nothing succeeds like success," is as true of this enterprise as of any other, and a grand success at the outset is often degraded into a failure, and not infrequently has been compelled to give way to a new comer. This is true quite often of the arc light systems, or, perhaps I should say was, not long ago, and the reason was nearly always found in some fatal error of plant construction or installation. I hope for the sake of Mr. Beals and the Petoskey people that their day of deliverance is near at hand.

While I have been writing, the dams above the electric light pond have filled to running over, and the light now is as handsome and brilliant as the best, while the dry weather so far assists in the insulation that the ground lamps at the station show no appreciable leak. When it does rain, however, the undertakers' wire will furnish plenty of escape points.

Detroit is more than aching for an electric street railway. Application has been made to the council for a franchise, and there is a fair prospect of the right of way being granted. The route is known as the Barbour-Marston-McLaughlin street route. The council committee to whom the matter was referred insisted that certain portions of the road be placed underground.

The system proposed is that of Sprague, and while Mr. S. stated that the requirement of the committee ordering that all wires within half a mile radius from the City Hall should be buried would be complied with, no such demand had been thought of in Cleveland, Ohio, Richmond, Va., Boston, and other cities. Within that half mile radius a heavy copper wire will be run in a half inch slot in the rail, narrower than the narrowest buggy wheel, and consequently perfectly safe from contact. Contact with this will be made by a brush or scraper. The rest of the road will be wired overhead.

The ordinance provides that the guage of the road shall be four feet eight and a half inches; that it shall be commenced within 90 days, and completed in 18 months.

The route is subject to so much cavil and wrangle, on account of other applications for franchises, that it cannot be named, as yet, but it is intended to run from the intersection of Holden road and the Boulevard to Detroit river; from Cadillac Square to the city limits; and from Joseph Campau avenue to the city limits.

The Palmer House, Chicago, until recently was possessed of a flag staff from which an American banner was wont to fly. It is no more. On the last day of July the elements, for some cause unknown, selected the staff for their victim, and lightning made kindling wood and toothpicks of the patriotic stick. The guests and boarders were considerably frightened, but the actual damage was quite slight. Some lightning rod man wants to see to it that the Palmer House is looked after at once, for lightning does, now and again, strike a flag pole in the same place twice.

The Palmer is a fire proof building, and it can do little harm for lightning rod fiends to have a little fun with it. C. C. H.

Petoskey, Mich., August 1st.

OUR BOSTON LETTER.

(Special Correspondence.)

The Baxter motors are giving satisfaction to the electric light companies, and have demonstrated the feasability of running motors on arc light circuits. President Gilbert of the Boston Electric Light Company speaks about the motors in the following manner:

BOSTON, April 13, 1888.

BAXTER ELECTRIC MANUFACTURING AND MOTOR CO., BALTIMORE, MD.

Gentlemen: In reply to yours of April 3d, will say we are using 40 of the Baxter electric motors varying from one-tenth h. p. to 10 h. p., and are very much pleased with them.

We are using them both on Brush, Thomson-Houston, and Fuller-Wood systems of lighting; with our experience we think it would be impossible for any one to make a mistake who buys a Baxter motor for the arc circuits. Yours truly,

BOSTON ELECTRIC LIGHT CO.,
F. A. GILBERT, *President.*

While speaking of electric motors, I must not neglect to tell you that the superintendent of the Tremont Electric Light Company is confident that he has discovered a new and valuable improvement for electric street railways. "There's many a slip," you know, but if a Boston man can lead the march of progress in this very active field, we will all be glad to know it.

Mr. Fred. A. Gilbert, with his usual pluck and energy (thanks, I occasionally smoke), is building a $200,000 electric light station on the Boston water front, or rather on the water itself, for the station extends over quite a distance from *terra firma*. It will be most conveniently located for getting fuel and other supplies, and has proved a fine summer resort for the sylph-like form of Col. Gilbert, who has spent so much time rowing in his boat and wading around in his top boots supervising the work, that he has not found it necessary to seek any other watering place, and has secured a seabreeze color and tan that the most skeptical could not attribute to any other fluid. The station will be a very complete and modern one, comprehending several systems. The other Boston stations will continue to be operated by Mr. Gilbert, each supplying its particular locality.

Secretary Cram, of the New England Telephone Exchange, is kept quite busy with the work of the Exchange, which is rapidly increasing. I am informed that the Schuyler Company, which at first objected, has decided to join the Exchange, and this now comprehends all the companies.

The agents of the Edison Company meet in this city this week. A large attendance is expected. H.

Boston, August 6th.

OUR LONDON LETTER.

(Special Correspondence.)

TWO PATENTS ANNULLED.

During the past fortnight the attention of electricians has been mainly taken up with legal matters, two important judgments having been delivered in the courts.

The first of these was practically in favor of the Brush corporation against the Edison Swan Company, for although it was held that the Cheesborough, *i. e.*, the Sawyer and Man patent, had been infringed, this is a point of minor importance, and Edison's main patent for incandescence lamps was decided to be invalid because the directions were not sufficient to enable any one at that date to make a commercially successful lamp without previous experiment, and also because the claim for "a lamp with a carbon filament" was much too wide.

The directors of the Brush corporation have now issued a manifesto, congratulating the shareholders on their success, and saying that although it is quite possible that the Edison Company may appeal to a higher court, they have no misgivings as to the result.

The other important decision is that in favor of Ferranti, against Messrs. Gaulard and Gibbs. There is no doubt that Gaulard and Gibbs first practically developed the transformer system, and the evidence showed that every system which could be brought forward as an anticipation, though it made use of the same class of apparatus, was intended to be an improvement on entirely different principles to those which are explained in this specification. Other inventors had thought of using transformers, but only because it was considered safer to have the lamp on a different circuit from the generator, so that if anything went wrong with the former the latter might not be affected, or because they thought that if you used a transformer, the lamp could not use up any of the power which was put into the primary circuit. No one saw that the use of secondary generators made it possible to economize the leads. This was what Gaulard and Gibbs really discovered, and yet their patent is annulled, owing to a small defect in the wording of the specification, which omits to describe any special construction of the apparatus.

The patentees had never attempted to make a close monopoly of their system, and had freely granted licenses to others, who wished to embody the same ideas in different forms of apparatus; and one cannot help regretting that the technicalities of the patent law should have defeated their own object, *i. e.*, the protection of the inventor of that which is new and useful.

ELECTRICAL QUACKERY.

For several weeks the electrical papers have been expending a good deal of energy in advertising a certain Mr. C. B. Harness by pointing him out to public as an impostor and swindler. The story seems to be this. A few years ago C. B. Harness was in the employ of a firm who kept a fancy warehouse in the city; this he left to set up a business of his own in the same line.

However, finding that times were bad, he invented an "electropathic" belt and advertised himself as "Dr. C. B. Harness, the eminent medical electrician, and head of the British Association of Medical Electricians." The distinction "Dr.," as he afterwards explained, was placed before his name by an error on the part of one of his advertising clerks.

After a time his dupes began to find out that his apparatus did not seem to do much good, and letters have been pouring in from old ladies and others, who have been persuaded to part with their shekels for some worthless piece of quackery. One cannot but be glad that the man has been well jumped upon, but his success is only a fresh instance of the extraordinary power of extensive advertising, and this scandal will probably do the victim more good than harm, for in a few years people will remember the name, but have forgotten the incident connected with it, and will be as ready as ever to be fooled.

AN ELECTRICAL CHAMBER OF COMMERCE.

It has recently been proposed to form an electrical section of the London Chamber of Commerce, and a meeting of influential members who were interested in that question was held last week, to decide what steps should be taken. The section, when formed, would probably be subdivided into different subsections to deal severally with telephone, telegraph, or lighting questions. Any decision arrived at by a section which wishes to make a formal communication with another section, or with a foreign Chamber, is first referred to a central committee of representatives elected from each trade.

At the meeting above referred to, the four or five members present merely agreed to issue a circular convening a meeting of the trades on July 27th, and to obtain the names of as many intending members as possible.

WIREMEN'S SOCIETY.

Talking of societies, the wiremen are trying to get up a committee for giving certificates to competent lead runners, who would agree not to work at less than 8d. an hour. At present, many firms employ laborers at 5½d. an hour to do the wire work. These, of course, are men of no training, and cannot even make a proper joint. The result, of course, is failure. G. H. O.

London, July 21.

Electric Club Notes.

Mr. C. J. H. Woodbury, of Boston, browned by a week's fishing, was a Club visitor last week, and enjoyed an evening with "Nadjy."

The flowers and vines in front of the Club house are attractive features.

Prof. John P. Barrett, the widely known electrician of the city of Chicago, was so pleased with the Club during a recent visit, that he has become an enthusiastic member.

Although the hot weather takes a great many of the Club members out of the city, the regular dinner Thursday nights of each week are well patronized, and are pronounced the best *table d'hote* dinner served in New York.

President Davis of the Electric Club sailed from England last Saturday on the "Umbria," and is expected in New York the last of the week. He could not get away on the "City of New York," as at first intended.

Mr. E. T. Gilliland, vice-president of the Electric Club, accompanied by his wife, sailed for Europe on the "Etruria" Saturday, to be absent two months. Mr. Charles W. Ward, general manager of the Geneva Non-magnetic Watch Company, and a member of the Club, expected to be one of the party, but was detained in New York. Mr. John C. Tomlinson, one of the managers of the Club, and his bride, and the Misses Gaston, of Indianapolis, completed the party of electrical tourists. Handsome baskets of flowers were sent on board by several friends, and Mr. Edison, Mr. Ward, Lieut. Toppan, Mr. Tate, Mr. Price, Mr. Brewer, and several other friends were at the steamer wishing the party *bon voyage*.

—— The Wheeling, W. Va., *Register*, is urging the city fathers, the gas works being the property of the city, to adopt the electric light, and thereby prevent the rapidly decreasing value of the gas plant. It asks the council to authorize the gas trustees to proceed in the preliminary preparations for producing the light, confident that the next legislature will grant the required charter if asked.

—— An electric light installation has just been erected by the Toulouse Gas Company in the Theatre du Capitole in that foreign city. Current is supplied by two 500-light Breguet dynamos, each being driven by a two-cylinder Otto gas engine of 50 h. p. The dynamos and gas engines are placed in a cellar situated a short distance from the theatre. There are 1,000 lamps of 10, 16, and 20 c. p. installed, and they have been fixed to the existing gas fittings. The lamps are supplied from two circuits which are so arranged that should an accident happen to one the lamps in the other will not be extinguished. The lighting is said to be very satisfactory, and the installation has been carried out under the superintendence of M. Brouardel, manager of the Compagnie Française du Centre et du Midi.

TELEGRAPHIC

.... There were rumors afloat last Monday and Tuesday that negotiations were under way for a transfer of control of the Western Union Telegraph Company from Jay Gould to the Vanderbilts, but, as yet, nothing definite has been heard.

.... The ELECTRICAL REVIEW reprints the article by Commander Allan D. Brown, assistant superintendent of the Naval Observatory, on "The Electrical Distribution of Time," which recently appeared in the proceedings of the Franklin Institute. This article contains a careful statement, covering the entire history of what has been accomplished in this country and in England in perfecting electrical time signals.—*Army and Navy Register.*

.... At Lewiston, Me., recently a bolt of lightning took to the telegraph wires along the B. & P. road, in the town of Lagrange, running for over a mile. About 20 poles were split from the top to the ground as though cleft with powder. The electric wave played zigzag in the sky, thoroughly frightening the people around about. The station agent at Lagrange says that it cracked them up in good shape, and that the report was like the bursting of a bladder in his ears.

.... One of the most important measures affecting telegraph interests adopted at the present session of Congress was the passage by the Senate of a House bill providing for the abrogation of the arrangements by which the Western Union Company operates the telegraph lines along the subsidized and land-grant railroads and requiring their operation by the latter companies, thus providing that the lines shall be opened to all competitors on equal terms. The Interstate Commerce Commission is empowered to regulate the telegraph rates. This legislation is the outcome of the agitation on the part of the Baltimore & Ohio Company, prior to its absorption by the Western Union, to obtain equal facilities with the latter on Pacific railroad telegraph lines.

New Cable Facilities.

The State Department was last week informed of telegraphic communication between the Dutch Colony of Curacoa and North America. Congratulatory telegrams were exchanged between the Governor of Curacoa and the Presidents of the United States and San Domingo.

Cable communication was opened at the same time from New York to Hayti and San Domingo, West Indies, via Santiago de Cuba. The rate, per word, to Mole St. Nicholas, Hayti, is 56 cents, and to San Domingo City $1.06.

Electricity May not Kill.

Mr. H. M. Stevens, of Boston, relates his experience with the electric current, and expresses many doubts of the wisdom of adopting electricity as a means of executing criminals. Mr. Stevens is reported as follows:

He was engaged in making some investigations on an electric light circuit in Lowell, Mass., supplying 25 arc lights of 2,000 candle-power each, and, his foot slipping on his stepladder, he instinctively placed one hand on the wire to steady himself. He was unable to recover himself fully and his forehead touched the wire, thus sending a current through the arm and, presumably, through only one of the lobes of the brain. He subsequently remembered the thought passing through his mind, that he had received such a shock as to incapacitate him from retaining his position, and he impulsively caught at the wire with his other hand Had he thought once more he would infinitely have preferred falling to receiving the full charge of electricity through his body, but he grasped the wire with his other hand, receiving the full power of the current and putting out the lights in the entire circuit. His hands, where he grasped the wire, were burned to the bone, and he fell, lying unconscious on dry ground for six hours.

When he was found it was discovered that the shock had burst blood vessels in the head, and that blood had gushed from his nose, mouth and ears. He was taken to a hotel, and subsequently to the hospital, where no signs of life were visible, even to experts. The same treatment was resorted to, however, as it is customary to use with persons apparently drowned, and after a long time, some slight evidence of returning consciousness rewarded the efforts of the attendants. The tongue was then drawn forward and whiskey poured into his mouth, where it remained for a long time, not a bubble appearing.

Mr. Stevens says when he began to recover consciousness it seemed to him as if he had neither arms nor legs, but simply a trunk and head, and as he remembered nothing of the circumstances, he connected the aroma of the whiskey with an idea that he must have been in some way induced to drink to intoxication, and had become the victim of a railroad accident.

He could not for a time be persuaded that he had any extremities, until an attendant lifted one of his legs, when it seemed to him, he says, as if it was stretched out to an infinite distance, the foot being miles away.

The special interest which the case has at the present time is the recent adoption of the method of electrical executions by the State of New York; and the suggestion is offered by Mr. Stevens, that if criminals are to be executed by electricity, cremation rather than burial had better follow, thus avoiding the possible occurrence of a horrible return to consciousness in the tomb.

A Cure for the Telephone "Complaint."

A Fall River correspondent, Mr. T. R. Vestal, writes to the *News* of that city the following:

In Saturday's *News* I read an account of several hundred subscribers who imagine that they are not treated courteously or with prompt attention. As the number is so large, and their grievances so great, I would suggest a very simple remedy, which has worked well in my case:

Rule 1. Never meddle with your telephone when some one else is using it.

Rule 2. Never address the central office as though its attendants belonged to you. Slavery is abolished, thank the Lord.

Rule 3. When you have disgusted the central office with your arrogance and they have shut you off, don't run into the office of some one who is in the habit of exchanging courteous treatment and think your voice will not be recognized.

If your disease has not become chronic, a six months' course of the above prescription will secure the most pleasant relations between you and the central office. I speak from experience.

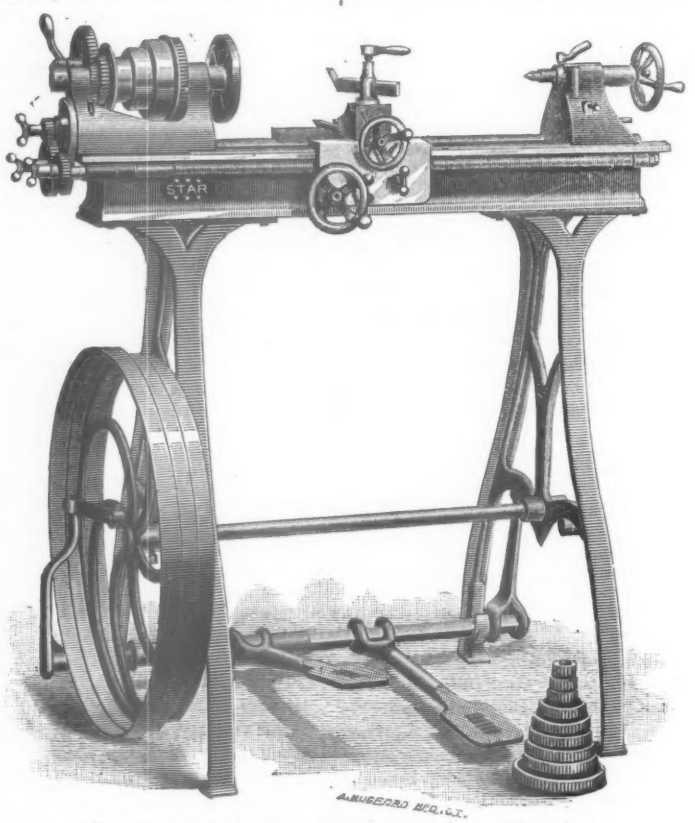
The "Star" Screw-Cutting Lathe.

The lathe illustrated in this issue is manufactured by the Seneca Falls Manufacturing Company, New York, and possesses a number of very excellent features that will commend it to all workers in this field. It is a new back geared screw cutting engine lathe, with automatic cross-feed. It swings nine inches on the face-plate, five and one-half inches over tool carriage, 25 inches between centers, and is a strong, solid and thoroughly well built machine.

The tool carriage is strongly gibbed to the bed, the rest has an automatic cross-feed, which will feed in or out, securing perfect accuracy in turning or facing up work, and with the addition of simple attachments a great variety of milling may be done, features that will be appreciated by all mechanics.

It is provided with an automatic feed which is thrown in or out of contact by turning a thumb nut, and by simply moving a lever, it will feed right or left, cut screws right or left, or be thrown out of gear entirely.

It will cut threads from 3 to 64, inclusive, without compounding the gears, and any number of threads by compounding. All gears are cut from solid metal by automatic machinery and run smoothly.



THE "STAR" LATHE OF THE SENECA FALLS MFG. CO.

It has the company's patent foot power, which is very powerful, consisting of double treadles, with a walking motion, embracing an entirely new principle; the treadles are movable and work independent of each other, each being connected at opposite ends of the driving wheel shaft in such a manner as to produce a strong, positive and continuous power. It can be started or stopped instantly, and may be operated with both feet sitting, or one foot standing, as desired.

Increase in Long Distance Telephoning.

A good business has been done this Spring, and an encouraging increase has been noticed in the operations of the long distance telephone lines. Our readers will remember that the service of this company has been thoroughly described in previous issues. Since the time of the blizzard, however, the business of the company in Boston has been about doubled. From New York, which is the central office of the company, 100 lines start toward Boston, and there are at present about 50 subscribers in that city. From the central office in New York there are lines running southward to Philadelphia, and to the northward as far as Albany and Troy. A line to Buffalo is being built now. It is being pushed as rapidly as possible, but owing to the thoroughness of the work, it is necessarily slow. The line from Boston to Providence is being rebuilt, and is nearly complete.

Electric Car Propulsion.

TO THE EDITOR OF ELECTRICAL REVIEW:

Very interesting and extended accounts are appearing in electrical journals just now on the interesting subject of electric railways.

Electricity is the ideal means of propelling passenger cars in cities and suburbs. No electrical engineer, I think, can doubt its final adoption on all prominent roads where the comfort of passengers or the highest return to the stockholders is well considered.

How the current shall be conveyed to the car, and many of the other details of installment are, as yet, open questions.

At this time the single overhead "trolley-wire," with the tracks as the return for the circuit, seems to be coming to the front as the principal feature of merit.

Nothing has so far appeared in articles I have noticed, discussing the dangers involved in this system.

It is to call attention to this new danger to the property and lives of those interested in other branches of electrical business, that I venture at this time upon the indulgence of the readers of the REVIEW.

In the early days of electric lighting it was quickly demonstrated that the grounded circuits and uncovered electric light wires were dangerous both to life and property; the fire insurance underwriters were not slow to enforce the use of covered wire and metallic circuits well insulated, at all points, from the earth.

The power system, now attracting so much attention, not only in a marked degree embraces these two dangerous features, but adds another element, that of "day" currents.

It is evident that it will require but a moment's touch of a telegraph, telephone or other ordinary line to the power or trolley line, to destroy the instruments and cause danger to life.

Five hundred volts is the maximum electro-motive force supposed to be employed; but even this is ample to destroy ordinary electrical instruments, and I am unable to find good authority who will say such a current is not dangerous, under certain ordinary conditions, to human life. At least there is a danger of so shocking a lineman as to kill him by a fall which may be no less certain or painless than by direct action of the current.

A horse, I understand, has been killed by a shock from the lines at Richmond, Va., and telephone men there are required to wear rubber gloves while at work.

Such powerful currents, when connected at several points with the earth, distribute through an extended area and trouble all open circuit wires grounded within the influence, though no actual contact of lines has taken place.

I would suggest that, in constructing electric railways, preference be given to systems using two trolley wires instead of the track as a conductor, or to the conduit system; also that where naked wires *must* be used, "guard" wires be placed the entire length of the roads in such a manner that foreign lines cannot come in contact with them.

There can be no excuse whatever for still further extending the danger (as I have found in one system) by use of uncovered "feed-wires." Let not cheapness be the first consideration in this new field of electrical progress.

All those interested in the safety of linemen and property, may do well to carefully canvass the subject from all standpoints.

I. H. FARNHAM.

Boston, July 31, 1888.

The Electrical Supply Company has just put upon the market an article which looks very much like a roll of insulating compound. Looks, however, are deceiving, and the "Patent Commutator Conserver" is a very handy lubricator for dynamo commutators. Those who have used it—and there were several of these before it was placed on sale—recommend it highly for the purpose named.

De Bausset's Air Ship.

There has been so much said of late on the subject of aerial navigation, *in re* of the proposed placing by Congress of $150,000 at the disposal of the Chicago inventor and scientist, that the REVIEW presents to-day a few facts and data on the subject of Dr. de Bausset's monster air-ship.

The general principle on which the doctor depends for buoyancy is entirely distinct from that ordinarily called to the aid of the aeronaut. The ephemeral nature of a gas-filled balloon is its weak point. The aerial navigator of a gas-filled balloon must needs waste a certain amount of buoyancy each time he lowers his altitude, and discharge a portion of his ballast each time he rises. The number of times these oscillations may be made available is quite limited, and once this limit is reached, the navigator is forced to come to the earth, and in consequence of this limited play of buoyancy, all gas balloons are, per force, doomed to short time, and their handling attended with much risk.

The de Bausset principle, he tells us, is based on the use of vacuum in place of gas, for, as balloon gas is lighter than the atmosphere, so is a perfect vacuum much lighter than gas, while a partial vaccum will be as light or lighter than that fluid.

It is a simple matter, knowing the weight of water and air and hydrogen, to calculate the lifting power of a given per cent. of vacuum, and by known laws the strength of materials, the friction opposed to moving bodies in air or water, every known problem in the calculation may be worked out by a schoolboy. There is nothing intricate in the calculation, and it is only the magnitude of the undertaking—it is such a long leap ahead—that the world is not prepared for.

"Now, without further preliminaries," says the inventor, "the proposed aeroplane will be large, quite large, and of the general shape shown in the illustration.

"This double-pointed cone is of steel, $\frac{1}{44}$ of an inch in thickness, hollow, and so thoroughly braced that it will be impossible to crush it, even if I could produce a perfect vacuum. Suspended below it you see the car, in which there will be comfortable quarters for passengers, stowage for mails, light freights, etc., and withal, storage batteries, dynamos and propelling machinery. The details are all worked out perfectly.

"The steel cylinder seems light, but the thickness is sufficient," said he. "I have tested it by actual hydraulic pressure.

"The weight of the enormous vessel, about 738 feet long and 137 feet diameter, is 260,000 pounds, without the car. I said it was large. Well, remove three-quarters of the air contained in that shell, and we have an ascensional force of 140 tons of car, engines, dynamos, batteries, mails, and people. I will not enter into details of the exhausting of the cylinder, the navigation of the vessel, or its control as to direction, but give you some data from which you may make your calculations, and verify or disprove my own.

"An United States gunboat, of the pattern rated as No. 1 (a three masted steel schooner), has a capacity of 1,700 tons, with a wetted surface of about 12,000 feet, requiring about 2,400 horse-power to propel it at 16 knots per hour, but if a reduction of $\frac{20}{100}$ of motive power is allowed as resistance to propulsion by friction to longitudinal surface to keel and resistance of the rudder, the amount of motive power required will be reduced to 1,920 horse power; and if, instead of knots, the calculation is based on miles, the difference will be only of 1,665 horse power (knot, 6,086; mile, 5,278.86 feet) required to propel the ship at a speed of 16 miles per hour. And, by the difference of density between water and air at an altitude of $4\frac{1}{2}$ miles, it shall require only eight-tenths (0.8) of one horse-power:

"The specific gravity of pure water being 1; of sea water, $1\frac{1}{33}$; of air at sea level, $\frac{1}{800}$; of air at $4\frac{1}{2}$ miles altitude, about $\frac{1}{2000}$. One horse-power = 75 kilometers per second. Authorities: 'Fronch on Speed and Power,' 'Kirk's Analysis of Speed and Power,' 'Rankine's Formula for Augmented Surfaces.'

"My calculations are made for an altitude of 4.3 miles, with a temperature of + 4 degrees centigrade.

"Difference of density: Water being 1, air will be $\frac{1}{2000}$ at the altitude given.

"It is an easy matter to calculate from the above data the power required to navigate my air ship.

"I have an area of cylinder of 25,672.84 meters, with a transverse section of cylinder of 1,520 meters; angle of entrance of cone, 90°; speed, 50 miles per hour; weight of a cubic meter of air at sea level, pressure being about 0.76 centimeters (about 30 inches), is 1 kilogram 300 gramms, or 1,300 gramms.

"Speed and power: One mile being 1,609 meters, the resistance to the cylinder will be.....13.10 h. p.
And of the transverse section..... 7.35 "

Car below the cylinder: Length, 46 meters; sides, top and bottom, 32 meters:

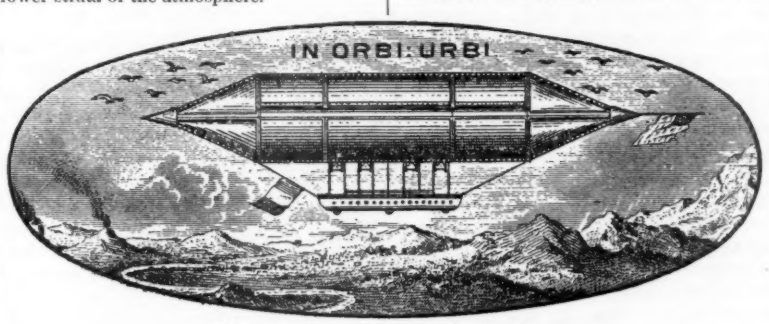
$$\left\{(46 \times 32 = 1{,}472 \text{ meters}) \times \frac{1{,}609 \times 50^2 \times 69 \text{ gramms}}{60^2 \times 2{,}000 \times 75}\right. = .75 \text{ "}$$

Transverse area, 8×8=64 meters.
Angle of entrance, 90 degrees.

$$\frac{64}{2} = 32 \times \frac{1{,}609 \times 50^2 \times \overset{\text{gramms.}}{1{,}300}}{60^2 \times 2{,}000 \times 75} = 0.30 \text{ "}$$

Grand total of motive power required for all resistance.....21.50 h. p.

and 21.50 horse-power will overcome a velocity of about 31 miles per hour in the lower strata of the atmosphere."



VIEW OF DR. DE BAUSSET'S AIR SHIP.

The appliances for creating this vacuum are electrical, and calculated for the displacement of more than 500,000 cubic feet of air per minute, and, like all the rest of the combination, these rest upon mechanical and electrical axioms worked out by mathematical formulæ. If there is anything wrong in these or any portion of the scheme, the Doctor is as anxious as any one to have it pointed out, as he has been earnestly searching for some flaw in his scheme for many years.

*** The amount of underground work done in Brooklyn by the telephone company, as reported in the REVIEW last week, was a surprise to many of the telephone people.

*** The request of the Rocky Mountain Bell Telephone Company to be permitted to erect poles on a certain street in Salt Lake City has been granted by the council, provided the city receive *free* service for all the telephones it may need. The Mormons evidently know a good thing.

*** A colony of prominent telephone men live in a very pleasant location at Morristown, N. J. Mr. Chas. F. Cutler, president of the New York and New Jersey Telephone Company, Mr. Ed. J. Hall, Jr., vice-president and general manager of the American Telephone and Telegraph Company, and Mr. Angus S. Hibbard, general superintendent of the same company, are occupants and builders of fine residences at Morristown, and several other telephonists are overcoming their antipathy to "Jersey," and are looking with longing eyes towards the beautiful city of Morristown.

*** The annual subscription to the telephone exchange in Vienna has been reduced to $40, and the immediate result of this has been that many new applications from intending subscribers have been sent in. The number of subscribers has lately increased from 900 to 1,200, and it is expected by the end of the year to be 1,800. No further augmentation in the number of overhead telephone wires is possible, and the new wires will therefore have to be laid underground. The present capital of the Wiener Privat-Telegraphen Gesellschaft is insufficient to meet the cost of the extension of their telephone service, and they are therefore raising a new capital of about $100,000 for this purpose.

Sliding Telephones.

Several Pittsburgh parties are using the telephone "elevator." The telephone, instead of being fastened to the wall, is fixed in a slide which runs up to any floor where the person is who is wanted, and he can answer without running down stairs. A loop of wire is attached to the bottom of the set, and a small cord over a pulley enables you to send the telephone up and down.

They have several of them up in that city. At the big iron foundry establishment of Lee & Company, when the people are fitting up work in any part of the city and wish to put a few questions to the chief pattern maker, who is on the top floor, they must wait until he is called down to the telephone. The telephone elevator enables them to send it up stairs, have the talk over and be run off before the pattern maker could get down stairs.

There is an undertaking establishment on Smithfield street above Murdoch's flower stores. When they leave the store below the undertaker slides the telephone up to his bed room, where he can be called at any time in the night.

But the nicest use that has been made of this device is by a gentleman in Oakland, a coal operator, who had a telephone in his dining room, says the *Chronicle-Telegram*. During the last rise he was called frequently during the night by dispatches from his boats and interests down the river. He would not always hear the alarm of the telephone from the room below, and several times when he did hear it, before he could get down stairs the connection was cut off. He had one of these little sliding boxes put in, and now he pulls the telephone up to his bed room when he retires.

The American citizen is not slow to avail himself of modern conveniences.

Telephone Communication Not Legal Evidence.

It is said to have become a practice with some notaries, commissioners of deeds, justices of the peace, etc., to accept a verbal statement through the telephone, that the person speaking—whose voice they are familiar with—has signed a certain document for which an official certificate is needed, and that by his thus speaking through the telephone, he acknowledges the same. This has been done in perfect good faith by notaries and others, under the erroneous impression that they were not infringing the law. Lawyers state that such a practice is a direct infringement of the law, evading the protection against fraud or error, which the individual appearance insisted upon in provisions devised to insure correctness was specially designed to cover. It is further held that in case of a forgery, the functionary who has in error attached his official signature to such telephonic acknowledgment would be held responsible for all subsequent loss or damage. It has been ruled that, whether any evil result follows or not, the functionary pledges his integrity that the signer appeared personally before him, and that speaking through a telephone is not a personal appearance. It is only a vocal indication of what may or may not be an individual identity at the other end of a wire. The functionary, therefore, places himself in the unenviable position of having officially certified to a falsehood. If such a case of illegal certifying were brought before the governor of the State, who had issued the notary's commission, the notary or other official person who did such a thing, would probably be censured and dismissed, or else punished.

Telephonic News

*** There are now about 600 telephones in use in the city of Rochester, N. Y.

*** D. J. Murphey, manager of the Telephone Exchange at Augusta, Ga., has issued an important notice of instructions to the subscribers that will greatly facilitate the working of the exchange.

*** The telephone companies and electric light companies are embarrassed in the Western States by the moving of houses from one site to another. Their linemen have to follow up these circulating structures and change the wires so that they may pass through the streets.

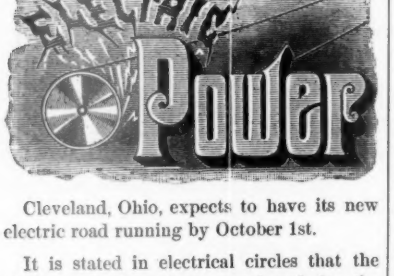
*** The new telephone building of the Southern New England Telephone Company, at New Haven, will have a frontage of 50 feet and depth of 72 feet. The front elevation of the building will be about 40 feet, and the material will be brick and quarry-faced granite. The building is to be three stories high, with a basement and attic.

*** In the new telephone set in use by the New England Telephone Company, the battery box, instead of being placed beneath the transmitter, is fastened to the backboard immediately beneath the bell, and the transmitter fastened on the front of the box. This takes up less room, and, besides, places the transmitter in a more convenient position.

*** The king of Sweden recently exhibited in person, among other things of note, at Stockholm, the telephone exchange to his guest, the new Emperor William of Germany. This will be interesting to electricians, and particularly to American electricians, as the Stockholm telephone exchange, like most of the other large telephone exchanges of Europe, is equipped with American apparatus, the switchboard being the Western Electric multiple.

*** A big fight has been in progress at Montreal between the Bell and the Federal telephone companies. The latter having obtained authority to erect poles on the streets not occupied by the Bell Company, the Bell people ran up poles bearing "dead" wires to shut them out. The Federal Company strung wires in St. Patrick street above those of the Bell, whereupon their rivals raised their own lines, cutting the Federal Company's wires in doing so. The Federal Company prosecuted the three men who cut the wires, and they were fined by the police magistrate. The Bell people now talk of an injunction.

*** A committee of the New Orleans Council recently held a meeting and discussed an ordinance introduced to reduce telephone rates to $50 per annum. Judge T. L. Bayne and Messrs. Crandall, Fowler and Boffinger, representing the Telephone Company, were in attendance. The ordinance was discussed generally, and a number of letters from other cities, in reference to telephone matters, were read. The telephone representatives held that the ordinance was illegal, and the Councilmen differed with them on that rather important point. The fact that a similar ordinance had been passed in St. Louis had caused a regular telephone war, and had finally found its way to the Supreme Court, was brought out during the discussion, and it was finally concluded to defer action on the ordinance for the present. During the discussion a statement of rates charged for telephones in different cities, was submitted by the representatives of the telephone company in proof of their statement that New Orleans was receiving a cheap service. Chicago, $125 per annum; Philadelphia, $120, Baltimore, $100, Cincinnati, $100, Atlanta, $60, Cleveland, $180, Milwaukee, $60 to $100, Kansas City, $72, New York, $150 to $200, Louisville, $72 to $96, St. Louis, $100, New Haven, $50 to $75, Washington, $100, San Francisco, $60 and over, Pittsburgh, $84, Boston, $120, Rochester, $64, Brooklyn, $120, New Orleans, $96.



Cleveland, Ohio, expects to have its new electric road running by October 1st.

It is stated in electrical circles that the Tesla motor has been purchased by the Westinghouse Electric Company.

The Sprague Company are still adding to their already long list of roads, the last one being a contract to equip the Sandusky, Ohio, Street Railway.

W. H. Armstrong is reported to be arranging for the erection of an electric car manufactory on the Pacific coast, probably near San Francisco.

The Amsterdam (N. Y.) common council has granted a franchise to the Amsterdam Electric Street Railway Company to build and maintain an electric railway through certain streets of the city.

The Hartford Dynamic Company will soon begin the work of putting in the electric road and electric lights for the Southington and Plantsville Tramway Company, the contract having been signed on Saturday.

An electric railroad will encircle the exposition grounds of the Buffalo International Fair, which will be opened September 4. On this road one will be able to get a general idea of all the wonders of the fair in a very short time.

The ideal railway system for Chicago, says the *News* of that city, would seem to be a combination of electric motors with the Meigs system of track and equipment for express speed—say 30 miles an hour—and these elevated roads to be supplemented with electric surface roads for way or short distance traffic. But no more cables of the Yerkes pattern.

The Baxter motor works are rapidly approaching completion. A large force of men, in addition to the masons and carpenters, are now at work putting in the boilers, engines, shafting, etc., and the company expects to begin moving to their works about the middle of the month. These new shops of the Baxter Motor Company have given a boom to real estate in that section of Baltimore.

Allegheny City, Pa., has an electric railroad that is a success beyond all question, and has been so pronounced by experts from all parts of the country. It combines both the overhead and the underground systems, and performs wonders on heavy grades. It gives a higher rate of speed than can be obtained on the cable lines, and is much more cheaply constructed and operated. From present indications, five or ten years hence will see no more horses in use for propelling street cars. Already many electric roads are in operation in different parts of the country, and many of the old style are contemplating changing to that form of propulsion. It looks as if electricity was destined to be yearly developed into the new forms of service for mankind, and finally furnish us with heat, power and light.

The Julien Company expect to be ready to run electric cars on the Fourth avenue road early in October. The Fourth avenue road, notwithstanding repeated efforts, has not yet obtained permission to run electric cars below Fourteenth street. The opposition is thought to come largely from aldermen who believe that the stablemen and horseshoers among their constituents will resent the introduction of electricity. When the first 10 cars are ready they will be run along the line as far down as Fourteenth street. The charter of the company authorizes the use of "steam or other power," above Fourteenth street. Passengers who take the electric cars will, therefore, have to change at Union square. The officers of the company believe that the annoyance just caused will create a public sentiment upon the subject which the Board of Aldermen will not dare to disregard.

Heavy Swindling by Telephone.

A CHICAGO POLICE OFFICIAL MADE RESPONSIBLE FOR AN INTERESTING FAIRY TALE.

"It is a well-known fact that no other section of the population avail themselves more readily and speedily of the latest triumphs of science than the criminal class," said Inspector Bonfield to a Chicago *Herald* reporter. "The educated criminal," he continued, "skims the cream from every new invention, if he can make use of it. No safe has yet been constructed that keeps out the shrewd and determined burglar, and that's the way in everything. But I don't recall a case in which this truth was more brilliantly demonstrated than the Maxwell case."

"What case was that?" queried an old newspaper man present. "I don't recollect of ever hearing of it before."

"No, I suppose you don't," said Mr. Bonfield, musingly. "The fact of the matter is, it never was a case that properly belonged to the department, but I can speak of it now. You see it was at the time when the telephone had just been introduced into business and private use. George Maxwell—that's not the real name, but it will do as well—was at that time one of the most successful speculators on the Board of Trade, and was currently reported to have some time ago tipped the scale which marked the million. He was a young and handsome man, and he had just married a charming woman. It was an out-and-out love match. A score or so of messages were despatched every day during business hours. They contained such important queries as: '2.10 P. M. How are you now, lovey?' And replies like this: '2.35 P. M. I sigh for you. How is my sweetest?' Well, to save expenses and to increase the facility of communication, Mr. Maxwell connected his office with his home on Ashland avenue by private telephone wire. He was one of the first men in Chicago to do so. About five out of six business hours were now spent by him at the 'hello.'

"One day just before the close of business there was a ring at the telephone. The devoted husband, with a jump, was there. 'What does my sweet pet wish?' he murmured.

"'I'm no pet. You mistake me, sir!' came the reply, in an unmistakably masculine voice, a voice gruff and rasping, but very distinct.

"'Who are you, then?' asked the astonished millionaire.

"'I'm Thomas Jefferson Odell, the accomplished burglar, if you want to know.'

"'Repeat, please,' gasped the other.

"'Odell, the burglar,' came the answer over the wire.

"'The devil!' exclaimed Mr. Maxwell.

"'No, only one of his faithful servants. But, now, listen. I have no time to fool away. I and two of my pals have gained access to your house. The cook, the chambermaid, and your wife are lying here bound and gagged. The nigger coachman has been disposed of. Some bundles of oily rags have been judiciously distributed about the house, ready to be ignited.'

"'You bloody scoundrel!' shouted the agonized husband, whose eyes were bulging during this recital.

"'Don't excite yourself. Now, sir, here is my proposal. If you should disappear from the telephone without acceding to it, I shall set fire to the house. It's no use applying to the police, for we'd be too quick for them. You will see, Mr. Maxwell, that you are completely in my power. The only sensible thing you can do is to listen to my proposal and to agree to it.'

"'Oh, I wish I had my hand at your throat, you infernal villian!' shouted the millionaire, mad with rage.

"'But you know you haven't, so what's the use of talking that way! Let us talk business instead. I need a loan of $20,000 cash. I need it at once. If you are inclined to lend me that sum without guarantee I shall leave your house with my pals in exactly the same condition in which I found it.'

"'You are ruining me,' groaned Maxwell. 'And I don't think I have that much money in cash in the office safe.'

"'You'll force me to commit an atrocious deed,' came the remorseless reply.

"'All right, then—yes, I'll pay, but to whom?'

"'It is now 5.15 exactly. At this very moment my pal has entered your office to receive the money. You will pay him and he will tell you the watchword agreed to between us, which you will telephone to me at once.'

"Mr. Maxwell turned around. A stranger of pleasant mein, dressed in the height of fashion, stood before him. Said the visitor: 'I have called to collect a little matter of $20,000 for a friend of mine, Thomas Jefferson Odell.'

"'Correct!' replied Mr. Maxwell, who went to the safe, took from it two bundles containing $10,000 each, and handed the money to the stranger. The latter ascertained that the amount was correct, then placed the money inside his two breast pockets.

"'And the watchword?' queried Mr. Maxwell.

"'Do right and interfere not!' replied the burglar's confederate with a great deal of dignity, and strode out of the office with all the grandezza of a Spanish hidalgo.

"'Do right and interfere not!' joyfully shouted Mr. Maxwell through the telephone. 'And now you'll leave my premises, Mr. Odell, won't you? And as for my wife——'

"'Have no fear Mr. Maxwell,' replied the man at the other end. 'You have to deal with a burglar and a gentleman.'

"Mr. Maxwell locked his office, got into his buggy, and drove out to his house at a Maud S. pace. The more closely he approached the keener his fear of a catastrophe became. But as he stopped at the gate he noticed nothing out of the way. He sprang up the stairs, two at a time, and entered the pretty boudoir of his prettier wife. She was quietly reading.

"'You must have suffered, my angel!' he cried, and a sob shook his voice.

"The young wife looked up astonished. 'Suffered? I?'

"That burglar, you know—it must have been awful. Oh, you poor darling!'

"'Why George, dear, what is the matter? You speak in riddles.'

"But didn't he gag you?' he asked

"'Now, see here, George, I wish you would talk sense. What do you mean?'

"After Mr. Maxwell had finished the recital of his adventure he asked: 'Wasn't there somebody here using my telephone?'

"'Why, yes, there was,' replied Mrs. Maxwell. 'A young and well-dressed man, looking like a successful business man, came in, introduced himself to me as 'Mr. Thomas Jefferson Odell, a speculator,' and requested permission to make use of your private telephone to send you a message. Of course, I gave him permission. He used the telephone but a couple of minutes and then came back into the parlor, thanked me for the favor I had done him and went away, saying the telephone was a very useful invention—it facilitated business so much.'

"'And that was all? asked Mr. Maxwell; 'he didn't gag you and the servants? He was alone? He didn't offer violence to you?'

"Why, no! He was very polite and gentlemanly—quite as much as you are at this moment, George!'

"'Oh, the devil!' exclaimed George, with a wild outburst. 'What an infernal ass I've made of myself. Excuse me, pet, but I can't help it. I'll drive over and tell the police about it.'

"That's what he did," concluded Bonfield, "and that's the way I came to know about it. But after talking the thing over with me, and after consulting with the smartest detectives we had at the time, we came to the conclusion that there was no chance of recovering the money. The pair were too slick. And in spite of all we've done since then we've heard nothing more of the $20,000, nor of Mr. Thomas Jefferson Odell and his pal."

Very True, if Brains are Included.

From the Paterson Guardian.

They say that Mr. Edison is worth $6,000,000.

Manufacturing Notes.

The firm of W. R. Santley & Co., proprietors of the Wellington belt holder, Wellington, Ohio, was dissolved July 9th, Mr. R. A. Horr retiring. Mr. Santley will continue the business under the old name.

The Westinghouse Machine Company, of Pittsburgh, has issued a very attractive catalogue, descriptive of the new Westinghouse compound engine. Sections of this new and interesting engine are illustrated, and a carefully written description is published. The pamphlet will no doubt be much sought after by steam users, who should address the company at Pittsburgh.

In a recent issue of the REVIEW, the feed water heater of the Hussey Re-Heater and Steam Plant Improvement Company, 15 Cortlandt street, New York City, was illustrated and described. The cut was wrongly named, and should have been the Feed Water Heater instead of the "Hussey Re-Heater." There is quite a growing demand among electric and steam plants for the improvements owned by this company.

Mr. Chas. F. Reinmann, formerly with the lamp factories of the United States and Westinghouse Electric Company, and whose brother is superintendent of the lamp factory of the last named company, has established an office at 18 Ann street, New York, where he will manufacture and import scientific glass apparatus. He makes a specialty of incandescent lamps and glassware for electrical and experimental purpose. Mercury vacuum pumps of latest design are manufactured.

The phonograph will be manufactured in the new factory at Orange, now in course of construction, and will be under the superintendency of Lieut. F. W. Toppan, U. S. N., retired. The Edison Phonograph Company reserved the right to manufacture, in its sale of the phonograph business to the North American Phonograph Company. The graphophone, owned by the same gentlemen who own the North American Company, will be manufactured at Bridgeport, Conn., the former factory of the Howe Sewing Machine Company having been secured for that purpose. This is a fine building, 450 feet in length, fireproof, and thoroughly built in every way.

OUR CHICAGO LETTER.

(Special Correspondence.)

The Central Electric Company of Chicago has been made general Western agent for the Grove Electric Meter for measuring incandescent current consumption. "So far," Mc says, "I can't begin to keep up with orders."

The Chicago Edison Company has vacated its old, and gone into its new, quarters at 139 Adams street.

The Western Electric Company will furnish the lighting for the exposition building at Chicago again this season.

The People's Theatre at Chicago that has heretofore been but dimly lighted by gas, will soon come to the front as an electrically illuminated play house. The various companies are skirmishing in the matter. So of Hooley's. The summer season being about over the overhauling will soon begin, and the fall season will open under the glow of electric lights.

The Edison Company will furnish the electricity for the great Auditorium building, Chicago.

The Chicago end of the REVIEW is on a week's vacation among the sand flies and mosquitoes at the upper end of Lake Michigan, hunting fish and catching sunburns.

Chicago, July 29. C. C. H.

—— A despatch from Toronto, Ont., says that a contest is being made in Canada by the Westinghouse Electric Company of Pittsburgh, Pa., the United States Electric Light Company of New York and the Consolidated Electric Light Company against the Edison electric light patents, and that these companies are supporting applications to the commissioner of patents to annul them for non-compliance with the provisions of the patent act. The applications will probably be heard in September.

Elwell-Parker Dynamo for Electro-Deposition.

At the Inventions Exhibition in 1885, Messrs. Elwell-Parker showed, amongst other things, a new type of four-pole dynamo. This machine had a cylinder armature and two single horseshoe magnets, the four poles of which were arranged to produce alternate polarities. A similar machine was shown at the Newcastle Exhibition last year, but in both instances the dynamos were intended for incandescent lighting. Messrs. Elwell-Parker have now adopted this type for electro-depositing machines, and we illustrate a large machine recently built by them for an output of 1,500 amperes at 50 volts pressure, the speed being 450 revolutions per minute. For illustration and description we are indebted to our esteemed contemporary, *Industries*, London. This machine has a drum wound armature, 22 inch finished diameter, by 20 inches long. The winding consists of 80 wires counted all round the armature, and each coil embraces about one-quarter of the circumference. The equi-potential coils are not coupled internally, but the current is taken off by four sets of brushes. The armature conductor has a section of .2 square inches, and as the current divides into four circuits, each conductor has to carry 375 amperes. This gives a current density of 1,880 amperes per square inch. The total length of conductor wound on the armature is about 95 yards, being at the rate of a little under two yards per volt. As, however, this is a four-pole machine, the total length of conductor must be halved in order to obtain a fair comparison with the usual two-pole machines. On this basis, the machine produces one volt for every 34 inches of total armature conductor—a satisfactory result, considering the low circumferential speed of 2,600 feet per minute. The field is shunt wound, and the total weight of the machine is six and a half tons for an output of 100 electrical horse-power. A compound wound machine similar to the one illustrated, but having a shorter commutator, and being wound for a maximum pressure of 400 volts, has now been in use for several months, driving the Portrush tramway. In this instance, it was necessary to over-compound the field, in order to make up for the loss of pressure in the mains, and the machine was consequently designed to give 300 volts when there is no external current flowing, and 400 volts when the full external current of 200 amperes is flowing. In this case the speed is 500 revolutions.

Electric Lighting of the Thomson-Houston Electric Co.

The Thomson-Houston Electric Co. reports the following recent increases:

Bridgeport, Ct.	800 Incand.	
Augusta, Ga.	500 "	100 Arc.
Morgan Eng. Co., Alliance, O.	400 "	35 "
Buffalo, N. Y.		50 "
Columbus, O.		65 "
Owego, N. Y.		30 "
Northam Co., Phil., Pa.		50 "
Johnstown, N. Y.		60 "
So. Framingham, Mass.		30 "
H. Balleman, Brooklyn, N. Y.		30 "
Malden, Mass.	500 "	5 "

Also the following new installations:

Im. Op. Co., Southbridge	150 Arc.
Hoosac Falls, N. Y.	60 "
Knoxville, Tenn.	50 "
Pensacola, Fla.	50 "
Macon, Ga.	35 "
White Plains, N. Y.	30 "
Penn Bluff, Ark.	70 "
Pittston, Pa.	35 "

—— Five hundred feet of Cook's system of underground conduit is being laid on Woodward avenue, Detroit, with a view of testing it in connection with the Brush Electric Light Company's arc light wires. The outer conduit consists of a wooden box in sections, 12, 14, and 16 feet in length, with interlocking shoulders to form the joints. Inside is a continuous paper tube, prepared for use by being boiled in paraffine, thus rendering it impervious to water, which extends from manhole to manhole, resting on glass insulators. Through this is drawn the cable, after which the space between the box and paper tube is filled with composition. The paper tube and glass insulators make the lines when used practically the same as aerial lines. The conduit is being put down by Cook & Cole, the proprietors, and if it proves satisfactory, the Brush Company are expected to adopt it.

The Railroads will not Reduce Their Rate.

Samuel Duncan, Superintendent of the Allegheny County Light Company, went East last evening. Mr. Duncan is president of the National Electric Light Association, which will meet in New York in August.

The railroads refused to make a special rate for the members, and Mr. Duncan declares they will get even with the lines by holding only one meeting a year hereafter.—*Pittsburgh Despatch.*

—— An electric light plant is to be established at Port Arthur, Ont.

—— Thirty electric lights are soon to beam on Ionia, Mich.

—— Hagerstown, Md., is delighted over her electric-lighted streets. The electric light plant was finished a few days ago.

—— The Thomson-Houston Company have about 7,000 arc lights operated by gas companies.

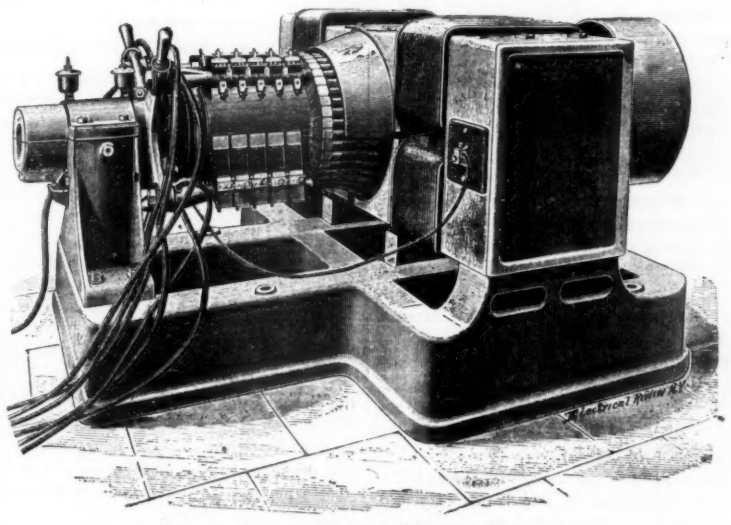
—— Gas companies are taking up the electric light in many cities and in this they are wise.

—— During the last two weeks the Fort Waye Jenney Company has sold about 22,000 incandescent lights in various parts of the United States.

—— The Electrical Accumulator and Lighting Company, of Detroit, has issued a "special postal card," on which are given a number of leading points connected with storage batteries. This company is succeeding finely with the storage battery business in that city.

—— At a meeting of the trustees of the Edison Light and Power Company, of Albany, last week, the following were elected officers of the company for the ensuing year: President, George W. Kirchwey; vice-president, James W. Hutt; treasurer, William K. Harcourt; secretary, C. B. De Noyelles.

—— Ground has been broken in New York City for the construction of a 50,000 incandescent plant of the Westinghouse system. The station will be located on West 24th street close to the river. Mr. Wm. H. Browne will be the general manager, and is actively engaged in completing contracts and arranging the details of the station.



Elwell-Parker Electro-Plating Dynamo.

—— A Cleveland Council Committee visited Detroit recently and inspected the electric light, and now declare Detroit the best lighted city they ever saw.

—— A number of cars on the Erie road are being lighted by electricity, the storage battery of the Electrical Accumulator Company being used.

—— The *Progressive Age and Water Gas Journal* is receiving many compliments over its improved appearance. And it deserves them all.

—— The Auburn (N. Y.) Electric Light Company is expending about $30,000 in new buildings and other improvements. This is an enterprising company.

—— The town trustees of Berkeley, Cal., have accepted the electric light company's contract for 30 lights at $200 per month, from May 16, 1888, to May 16, 1889.

—— The Citizen's Electric Light Company, of Fulton, N. Y., has obtained the contract of public lighting in Oswego Falls, for the coming year at $24.98 per arc lamp.

—— The Carbon works of the Thomson-Houston Company at Fremont, Ohio, are doing a very large business. The demand has been so great that a night and day force of workmen has been put on.

—— The loss of the foundry of the Edison Machine Works, by fire, will cause considerable annoyance to the company, on account of the destruction of patterns. 100 men were employed in the foundry. The cause of the fire is unknown.

—— The House, at Washington, has adopted a resolution for the employment of an electrical engineer to make plans and specifications for lighting the House and committee rooms by electricity, and to solicit proposals for the work.

—— Dr. Otto A. Moses, chairman of the Executive Committee, has issued very neat notices of the meeting of the National Electric Light Association, to be held at the Hotel Brunswick, this city, August 29th, 30th and 31st. Each member of the Association is requested to call and register his name and the firm he represents, in the secretary's room.

—— The Brush Electric Company have just finished the completion of a complete electric light plant at Greenville, S. C. The plant consists of one 100 h. p Ball engine, two arc light dynamos, capacity 60 arc lights, 2,000 c. p. each, and 500 incandescent lights. The building is entirely new and is very conveniently arranged. The whole plant, consisting of the following: boiler, engine, dynamo and line was shipped from Cleveland, Ohio, and Erie, Pa., installed, and the lights turned on within one month.

—— The Straight Line Engine Company have recently closed a contract with Mr. Elsworth L Striker through his electrical engineer, Mr. W. H. Cole, for two of their engines, to run the 1,800 light incandescent plant now being put in on Tenth avenue, between 52d and 53d streets, this city. A contract has been made with the Jarvis Engineering Company for settings and fronts for their boilers. Mr. Cole has bought the Westinghouse dynamos, and will use their system throughout. There are 17 houses to be lighted. A switchboard in the dynamo room will enable the attendant to control the lights in each house. In the basement of each house there will be another complete switchboard, from which each flat can be controlled. The houses will be fully equipped with electric door openers running to the kitchen of each flat, and electric calls with suitable annunciator in each kitchen. Mr. Cole will have charge of the entire work.

ELECTRIC LIGHT NEWS

—— Rawlins, Wyoming, is figuring on an electric light.

—— The town of Tuscarora, Cal., is to be lighted with electricity, and there is some talk of supplying Vallejo and Port Costa with light.

—— The Waterhouse Electric Light Company, of San Francisco, shipped to Seattle, W. T., a plant consisting of 175 incandescent and eight arc lights.

—— At Port Huron, Mich., the electric light plant, recently destroyed by fire, is sufficiently rebuilt for operation, and the streets are again lighted with electricity.

—— The Santa Rosa, Cal., City Trustees have contracted with the Santa Rosa Gas Light Company, to increase the electric light plant from twenty 2,000 candle-power lights to 25.

—— The request of the Saratoga (N. Y.) Electric Light and Power Company to erect poles in the street has been refused by the trustees. That body is of the opinion that the village should construct a plant of its own.

—— The Electric Lighting Committee of the City Council of San Francisco, Cal., is advertising for proposals to furnish 21 electric masts 150 feet high, and of 16,000 candle-power; and 102 masts 40 feet high, of 200 candle-power; also 77 other lights.

—— Chief Engineer Gereke is arranging to place an electric light engine in the North Side water-works in Chicago. The engine will be run with steam from the water-works boilers. The light will be used for illuminating the shore inlet and the engine-rooms at the water-works.

—— The foundation is being laid in concrete for the erection of a new building for the electrical works of the Oakland Gas Light and Heat Company on the water-front side, San Francisco. The company now supply 200 lights, but the new works will have the capacity of 1,000 lights, the cost to be about $100,000, of which $60,000 will be expended for dynamos.

—— The electric light plant purchased by the corporate authorities of Frederick, Md., of the Thomson-Houston Company, of Philadelphia, for the sum of $14,500, was put into practical operation for the first time last Friday, and proved a great success, all the streets being brilliantly illuminated. There are 60 lights, each of 2,000 candle-power. The people appear to be greatly pleased with the vast difference in the illuminating power of electricity as compared with the dim light heretofore furnished by the gas lamps.

—— The Albany Electric Light Company put the incandescent plant in operation last week, for the first time, and was highly successful. The plant consists of two Westinghouse engines and accompanying dynamos, is located on the lower floors of the Trinity place buildings, and is capable of furnishing 1,350 lamps of 16 candle-power. The intention of the company is to provide illumination for stores, business houses and offices, and subsequently the system will be extended to dwellings. The number of lights used the opening night was 150.

—— Mr. T. F. Cronice, representing the Westinghouse system of incandescent electric light, closed a contract with the Gainesville, Texas, Electric Light, Heat and Power Company for the machinery and apparatus for 1,300 sixteen candle-power lamps. The plant will be put in by the Marr Construction Company, of Pittsburgh, Pa., and is to be in operation by September 15th next. The electric light company will enlarge their present building, and will add a good deal of machinery, including new engines and boilers. This will be a great stride forward for the electric light company.

Lansingburg, N. Y.—The Union Electric Light and Power Company, of Lansingburg; capital, $10,000.

Carroll, Iowa.—The Carroll Electric Light and Power Company, Carroll; capital, $25,000. H. W. Macomber and others, incorporators.

Chicago, Ill.—Illinois Phonograph Company; capital, $1,250,000. Incorporators, Frank A. Wunder, Henry P. Barton, and William L. Abbott.

Yonkers, N. Y.—The Thomson-Houston Electric Light Company, Yonkers; capital stock, $100.000. Henry L. Storke and others, incorporators.

Chicago, Ill.—The South Side Electric Light and Power Company; capital stock, $500,000. Incorporators, H. V. Harris, James Hood and Frank Butterworth.

San Francisco, Cal.—The Merced Electric Light Co. Capital stock, $100,000. Directors, W. E. Dean, A. K. P. Harmon, Chas. E. Elliott, W. L. Dean and D. C. Bates.

Walla Walla, W. T.—The Walla Walla Electric Light and Power Company; capital stock, $10,000. C. E. Burrows, T. Quinn, H. E. Johnston, F. J. Parker, C. Ennis.

Portland, Me.—The American Electric Register Company, Portland; capital, $200,000. Charles F. Howe, Boston, Mass., and Charles A. Kellogg, Newton, Mass., incorporators.

Portland, Me.—The Enos Electric Systems Company; W. C. Otis, of Nahant, Mass., W. E. Plummer, Newton, Mass., and others, with a capital stock of $1,000,000. Its object is to make the Enos overhead railway system.

Camden, N. J.—The United Electric Improvement Company was incorporated in Camden. It will make electrical appliances at Gloucester. The incorporators are Waldron Shapleigh, of Woodbury, and Edward C. Lee and Randal Morgan, of Philadelphia. The capital stock is $75,000, of which $10,000 has been paid up.

Newark, N. J.—The Railway Electric Car Lighting and Signal Company, of Newark. The place of business is East Orange. Its objects are the supplying of electric light, heat and power, electric apparatus, signals, switches, switch towers, to railroads. The company will commence business with $1,000. The incorporators are William Brackin, New York; Henry G. Morris, Philadelphia; Henry Weston, New Brunswick.

A Novel Electric Tower.

Mr. Wm. J. Hammer, the electrical expert at the Cincinnati Exposition, is preparing a novel and unique exhibit. It is a mammoth Edison electrical globe, composed of 15,000 of the regular electrical globes. This exhibit will be nearly 30 feet high. It will glow as one colossal lamp of 100,000 candle-power. It stands on a base of about 3,200 globes that will gleam pure white, except where word "Edison" will flash and glow in colored effects.

There is the immense socket three feet high upholding the great globe inclosing the myriad smaller ones. From this great globe, which resembles a balloon, will come a soft radiance of colored lights, whose effect will be very beautiful.

At the front, just over the base, in tablet form, is a shield which will gleam in red, white and blue stripes, and the stars in blue field. On this shield will be the inscription in infinitesimally small globes of lettering, "Exhibit of Edison Lamp Co., Harrison, N. J., employing nearly 15,000 Edison lamps, and illustrating the capacity for manufacture of the factory per 24 hours. Designed by Wm. J. Hammer."

OUR RICHMOND LETTER.

(Special Correspondence.)

The citizens of Richmond, Va., and in fact the whole of the South Atlantic States, are making great preparations for the exposition which commences October 3d, and runs for 40 days. The applications for space are so numerous as to make the management add a number of annexes, although it was at first estimated that the large buildings now under construction would be fully large enough to meet every demand. The electric railroad is running a two mile double track extension of its lines right into the grounds and will be about the only means of transportation, except carriages and wagons, there will be from the city to the grounds. The railroad people are calculating to transport at least 40,000 passengers daily on this extension.

The exposition management have closed a contract with the Virginia Electric Light and Power Company to light up their entire grounds and buildings.

They will put up 150 arc and 500 incandescent lights. The whole plant will be run in the main building. The Armington & Sims engine will run the three 50 light arc, and the Westinghouse alternating dynamos, as well as two 40,000 watt-power dynamos, to furnish current to run a section of the electric road.

The art exhibit bids fair to be the finest they have ever had here, and will be lighted entirely by incandescent lights.

There will be an electrical department at the exposition under the charge of W. H. Cole, the superintendent of the Light and Power Company, and H. W. Tompson, superintendent Fire Alarm Telegraph, and they propose to make it a feature.

The Electric Railway Company, which has recently purchased the rival horse road, has commenced to put up poles and arrange to apply electricity to the whole system.

The Manchester Street Railway Company has also secured proper franchises, and is getting ready to put in electricity as the motive power. They expect to have all ready and running by October 1st.

The Electric Light Company, through Mr. Maurice B. Flynn, of New York City (one of the principal owners of both the railway and electric light companies), has closed a contract with the Westinghouse Electric Company for apparatus for 5,000 more incandescent lights, which will all be constructed by Mr. W. H. Cole, the superintendent of the company. Mr. Cole will have under his charge, when all is completed, probably the most complete electrical station in the country.

He will have apparatus to run about 30 miles of electric railroad, with over 100 cars, 7,000 incandescent lights, 500 arc lights, and a special power circuit using 300 horse-power, all under one roof.

Mr. A. E. St. Cloud has secured a franchise at Ashland, Va., and will put in an incandescent plant to light the town within the next 60 days.

Petersburgh, Va., has a nicely equipped Westinghouse alternating current plant of 650 lights, and is getting a fine service.

A 75 light plant of Westinghouse incandescent lights has been started this week for the Galleys Mills, Richmond, Va. It was furnished and constructed by Mr. W. H. Cole.

Mr. H. W. Thompson, who has just been reappointed by the Fire Commissioners at Richmond, will probably have added to his duties that of city electrician and have general supervision over all things electrical belonging to the city. We all hope he may receive the appointment, for he not only thoroughly understands his business, but is very popular with all. C. W.

Richmond, Va., July 28th.

—— Bissell's Point, St. Louis, will soon be lit by electricity. An appropriation for that purpose was made not long ago, but on account of its being too small no contract was perfected under it. President Flad, of the Board of Public Improvements, recently received a letter from the Fort Wayne Jenney Electric Light Company proposing to undertake the contract. The proposition was accepted. The board thereupon recommended an ordinance making an additional appropriation of $3,000.

A Western Storage Battery Plant.

To the Editor of Electrical Review:

The Missouri Valley Electric Light Company had a very successful opening on the 25th inst. The accumulator central station system is used, with great satisfaction to both the stockholder and consumer. The current is available at all hours of the day and night, and is being utilized for power as well as light, there being now three hundred 16 c. p. lamps and three motors in use. The plant includes a Fort Wayne Jenney dynamo, 66 cells of Electrical Accumulator Company's 15A cells, a Russell engine 10x12, and Sawyer-Man lamps.

The very high economy in running this station is the principal feature of the plant. On a recent trial, the night's run was made on a consumption of 390 pounds of soft pea coal, for 24 hours' service of current, the engine shutting down at 10.30 P. M., and the accumulators carrying the load after that time until the following evening.

The present capacity of the plant is 500 lights, and the company has application for 100 lights yet to be placed.

The plant was installed by the Interstate Electric Company, of Kansas City, Mo.

Missouri Valley, Iowa, July 28. M. V.

The Telephone Service in Washington.

Mr. S. M. Bryan, the president of the telephone company, told a *Star* reporter that the wires which were disconnected on the 20th of June, would be restored as soon as the district appropriation bill was signed by the President. This bill is now before the District Commissioners, and it is their intention to have it returned to the President for his approval. It gives the Commissioners authority to permit wires to be placed under the sidewalks if the interests of the public demand it, but such authority expires with the session of the present Congress. Mr. Bryan states that as soon as he gets the Commissioners' order allowing the work, that he will have a gang of men employed night and day until the work is completed. It is proposed to place the wires under the pavement outside of the curb of 15th street and New York avenue.

The fact that the company sent out bills for the full amount of last month's service, has been the subject of comment. Mr. Bryan explains that this was only done in order to keep the books of the company straight. A list of the subscribers—498 in number—has been prepared, showing the number of days that their telephones were disconnected. All the telephones were disconnected for the first three days, then connections were made for others, and in some cases, no connections were made at all. The length of time varies from three days to 28 and more. A proper rebate will be made for the time for which each telephone was disconnected from the general service. A rebate certificate will be furnished each subscriber showing the time lost and the money value, and this certificate will be recognized as money by the company. The subscribers receiving them can either have them cashed at the office of the company, or else they can be handed to the collector in part payment of the next month's bill. The certificates have not been issued yet, because the company has not been able to calculate as yet the individual loss. This will be done as soon as the connection is made. Mr. Bryan states that the collectors, in presenting their bills, were instructed to inform the subscribers of this rebate arrangement, and he supposed that they had done so. This rebate will only apply to those whose instruments were cut off. Other subscribers who were connected with the system, but who were unable to reach by telephone those who had been disconnected, would not receive a rebate, as it would be impossssble to determine the amount of damage.

—— The sub-committee on gas, of Allegheny, discussed the question of lighting the city by electricity, and approved specifications for 45 electric light towers, with 3 to 6 lights on each; 85 poles for single lights, and 1,500 incandescent lights, to be used in the City Hall, engine houses, etc. It was thought a better rate would be obtained by letting the contract for lighting for five years, and the question of the right of the committee to let the contract for that term was referred to the city solicitor.

Velocity of Electricity.

The question has been asked how rapidly does the electrical current travel? Prof. O. M. Mitchel, the astronomer, gave it in a lecture delivered many years ago, as follows:

"With what velocity does the electric current flash along the wire? I secured a telegraphic communication of wire entirely around from Cincinnati to Pittsburgh and back again, in order to determine whether electric magnetism accomplished the circuit of 607 miles of wire instantaneously, or whether it took some time. My disc was prepared and the clock beats were being received upon it. I arranged in such a manner that two pens should record upon a metallic disc, by steel points, by the most delicate dots imaginable, the time for the passage of the electric current. Then I prepared inside the observatory (at Cincinnati), a short circuit of six or eight feet of wire, and to that battery I gave the identical intensity which belonged to the battery of the long circuit. I then arranged in such a manner that I could interchange these two points with each other, making one move with the long circuit and the other with the short, at pleasure. Having arranged the whole apparatus, I watched with the deepest interest to see whether the clock beats, as recorded by the two pens upon the disc, would fall at the same moment of time, or whether an interval would exist which the eye or the ear could detect. But when the pens fell it wanted a keener and sharper ear than mine to detect any difference. I then looked to see whether the dots struck were in a straight line radiating from the center of the disc; but with the most rigorous examination I could make, I could discover no difference. I was compelled to restrain my curiosity until the night should pass and the daylight come again. Then, with an instrument constructed for the purpose of measuring the thousandth part of a second, I measured the interval between the two dots—those struck by the long and the others by the short circuit. I found invariably the same result in more than a thousand observations. How much time do you suppose it took the electric current to flash around the 607 miles of wire? I give you my own result. I divided a second into 1,000 equal parts, and that journey was performed in 21 of those parts—in $\frac{21}{1000}$ of one second of time."

The New Heliograph.

The heliograph board, convened some months ago by the chief signal officer to recommend a style of heliograph for use by the service, having completed its labors, has been dissolved. After having fixed upon a satisfactory instrument, some weeks were spent in testing its abilities, and Lieutenants Greene of the Signal Corps, and Maus of the First Infantry, established at different times communication between the Signal Office and Fort Washington, Fort Myer and the Soldier's Home, and Sugar Loaf Mountain and Fort Gaines. The experiments between the two latter points have just been completed after three weeks' work, with the most satisfactory results. The tests were very exhaustive, and were made in all conditions of atmosphere. The flash from the instrument could be read the distance of 40 miles with the unassisted eye, something unusual for this climate, and the officers agreed from the brightness of the flash on the clearest day, that it could have been seen a distance of 75 miles.

The heliograph, as finally agreed upon by the board, weighs about 18 pounds, and is conveniently portable by being separable into nine-pound packages. A contract has been awarded to Crane & Co., of Newark, N. J., for supplying 100 of the heliographs modelled after the board's instrument, at an average cost of $41. There were six other bidders, their proposals ranging from the contract price to $199.

Already many applications for the heliographs have been received at the War Department from the west, especially from General Miles, who desires to use them in the field in heading off Indian raids and other campaign work where courier service is uncertain and unsafe.—*Army and Navy Register.*

ELECTRICAL PATENTS

(Copies of any Patents in the following List will be sent to any address on receipt of twenty-five cents.)

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JULY 30, 1888.

386,796 Automatic regulator for electric lamps. 386,797 Method of automatic regulation for electric currents; Reginald Belfield, Great Barrington, Mass., assignor to George Westinghouse, Jr., Pittsburgh, Pa.

386,814 Art of telegraphy. 386,815 Telautograph; Elisha Gray, Highland Park, Ills.

386,828 Temperature regulator; Charles N. Johnson, Holyoke, Mass.

386,860 Coin operated induction coil; Perry G. Williams and Alfred W. Roovers, Brooklyn, N. Y., said Roovers assignor to said Williams.

386,886 386,887 Multiple switchboard; Milo G. Kellogg, Hyde Park, Ills.

386,898 Secondary battery; John S. Sellon, The Hall, Sydenham, County of Kent, England, assignor to the Electrical Accumulator Company of New York.

386,919 Coin operated electrical apparatus; Percival Everitt, London, England.

386,925 Electrical non-conductor; Charles T. Lee, Boston, and Charles N. Waite, Medford, assignors of one-half to the Gould & Watson Company, Boston, Mass.

386,936 System of electrical distribution; Marmaduke M. M. Slattery, Fort Wayne, Ind., assignor of one-half to the Fort Wayne Electric Light Company, same place.

386,956 Regulator for electric circuits; Reginald Belfield, Pittsburgh, Pa., assignor to the Westinghouse Electric Company, same place.

386,965 Telephone transmitter; William R. Cole, Detroit, Mich., assignor to himself; Frank G Smith and George W. Moore, trustees, same place.

386,974 Phonograph; Thomas A. Edison, Llewellyn Park, N. J.

386,986 Electric insulator peg; William E. Joslin, South Scituate, R. I.

386,992 386,993 Galvanometer; Philip Lange, Pittsburgh, Pa., assignor to the Westinghouse Electric Company, same place.

387,010 Brush holder for electric machines; Albert Schmid, Allegheny, assignor to the Westinghouse Electric Company, Pittsburgh, Pa.

387,044 Storm protector for electric lamps; Thomas H. Brady, New Britain, Ct.

387,049 Battery zinc; Robert L. Carr and Parker Borden, Fall River, Mass.

387,051 Lightning arrester for electric circuits; Frederick A. Cheney, Elmira, N. Y.

387,117 Apparatus for electrical conversion and distribution; William Stanley, Jr., Great Barrington, Mass., assignor to the Westinghouse Electric Company, Pittsburgh, Pa.

387,123 Flue for electrical transformers; Elihu Thomson, Lynn, Mass.

387,131 Electric indicator; William A. Anthony, Manchester, Ct., assignor to the Mather Electric Company, same place.

387,146 Galvanic boiler cleaning compound; Francis J. Clamer, Philadeldhia, Pa., assignor of two-thirds to Charles Wolters and Joseph G. Hendrickson, both of same place.

387,194 387,195 Regulation of electric motors; A. G. Waterhouse, Hartford, Ct., assignor to the Waterhouse Electric and Manufacturing Company, same place.

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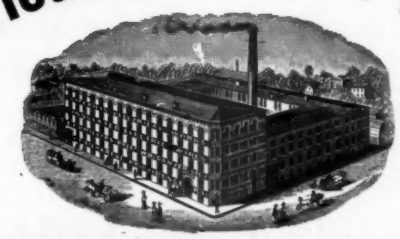

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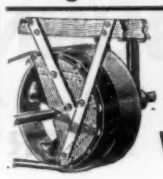

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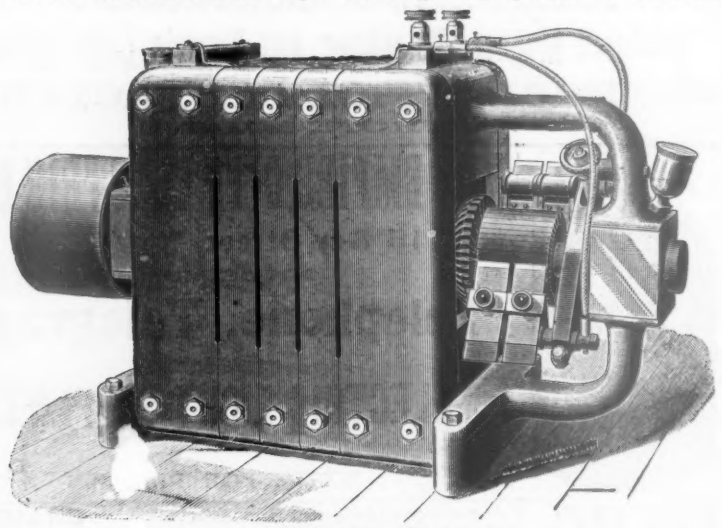

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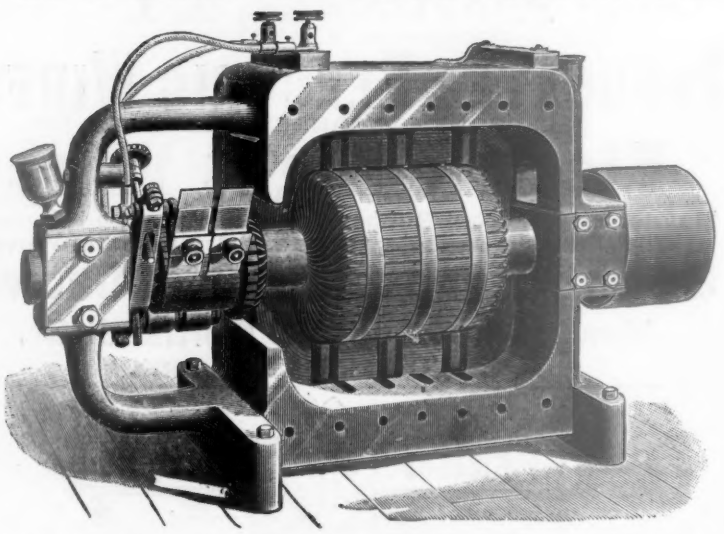

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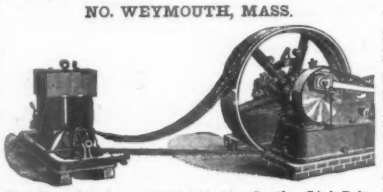

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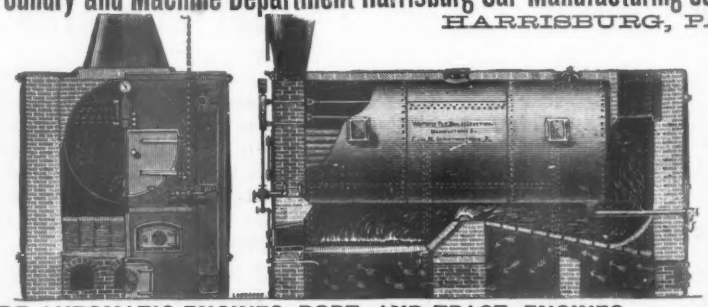

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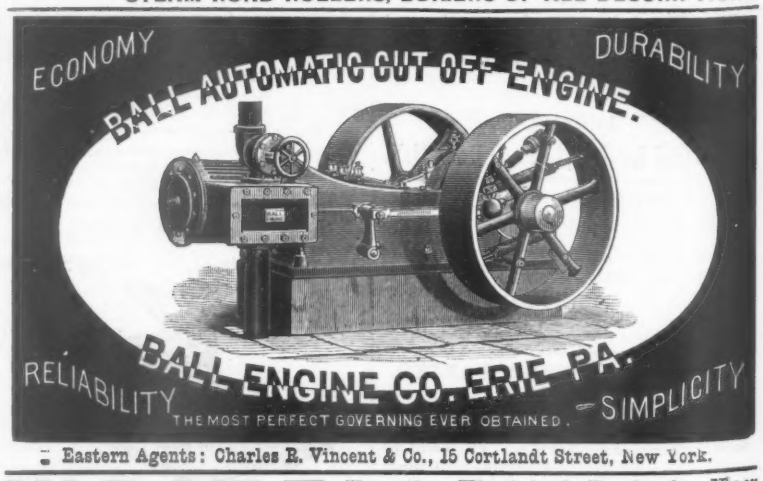

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